

Section 16062

CORROSION CONTROL TEST STATIONS

PART 1 GENERAL

1.01 SUMMARY

This Section includes test station materials, installation requirements, acceptance testing, and as-built documentation on water pipeline projects.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

No separate payment will be made for Work performed under this Section. Include cost of such Work in contract unit price for Section 16640 – “Cathodic Protection for Pipelines”.

1.03 REFERENCES

- A. ASTM D 1248 - Polyethylene Plastic Molding and Extrusion Material.
- B. AWWA M9 Manual - Concrete Pressure Pipe.
- C. NACE SP0169-2013 - Control of External Corrosion on Underground or Submerged Metallic Piping Systems.
- D. UL 83 - Thermoplastic Insulated Wires.
- E. UL 486A - Wire Connectors for Use with Copper Conductors.

1.04 SUBMITTALS

- A. Submittals to conform to the requirements of Section 01330 – “Submittals Procedures”.
- B. All required computations and drawings shall be prepared by or under the direct supervision of a Professional Engineer, registered in the State of Texas with a minimum of ten years of corrosion control experience.
- C. Submit manufacturer's catalog cuts for each item. Include the manufacturer' name on the catalog cuts and provide sufficient information to show that the materials meet the requirements of the Plans and specifications. Where more than one item or catalog number appears on a catalog cut, clearly identify the item proposed.
- D. During installation and construction, maintain as-built drawings of the corrosion control test stations. Revise drawings to show locations of all wiring, connections, and

terminal boxes. Properly identify all items of equipment and material. Submit the as-built drawings to the Project Manager.

1.05 RELATED REQUIREMENTS

- A. Section 01330 – “Submittal Procedures”.
- B. Section 16061 – “Joint Bonding and Electrical Isolation”.
- C. Section 16640 – “Cathodic Protection for Pipelines”.
- D. Section 16645 – “AC Interference Mitigation Systems for Pipelines Gradient Control Systems”.

1.06 QUALITY ASSURANCE

- A. Provide manufacturer's certifications that all components of the corrosion control test stations meet the requirements of the Plans and specifications. Reference the applicable section of the specifications and the applicable standard details on the certification.
- B. All materials, fabrication, and installations are subject to inspection and testing by the Owner. Testing and inspection by Owner does not relieve the Contractor of any obligation for full compliance with this Specification.

1.07 – 1.13 NOT USED

PART 2 PRODUCTS

2.01 MANUFACTURER(S) (NOT USED)

2.02 MATERIALS AND/OR EQUIPMENT

- A. Flush Mount Test Stations
 - 1. Test stations consist of test wires, a terminal box and a valve box as shown on the Plans.
 - 2. For the terminal box, use an orange terminal Big Fink as manufactured by Cott Manufacturing Company or approved equal. The minimum number of terminals on the board shall be per the Plans.
 - 3. For the concrete valve box; use a 10.25-inch diameter 3-RT with a cast iron cover marked "CP Test" as manufactured by Brooks Products, Inc or approved equal.
- B. Permanent Reference Electrodes

1. Type: Provide a copper/copper sulfate, double membrane, ceramic cell in a geomembrane package such as a Permacell Plus or approved equal.
2. Wire: Equip the electrode with No. 14 AWG stranded copper wire with blue HMWPE insulation of suitable length to attach to the terminal board of the test station without splicing.

C. Test Station Lead Wires

1. All test station lead wires of all sizes shall have THHN stranded insulation, except for the permanent reference cell wire and where otherwise shown on the Plans.
2. Color code for wire insulation based upon connection to underground structures:
 - a. Water piping: white.
 - b. Foreign structures: red.
 - c. Steel casings: yellow.
 - d. Permanent reference cell: blue.
 - e. Adjacent structures: black.
3. Wire all terminal boards using suitably sized compression ring connectors as shown on the Plans.

D. Exothermic Weld Equipment

Charges and Molds: Select weld charges and mold size for the specific surface configuration in accordance with manufacturer recommendations. Use Erico Cadweld, or Continental Industries Thermoweld weld charges and molds.

Repair coating to be 2-part epoxy repair kit SPC SP-2888 or approved equal. Specific coating system used shall be completely compatible with pipe and factory-applied pipe coating materials.

PART 3 EXECUTION

3.01 GENERAL / MANUFACTURER(S)

- A. Locate test stations as shown on Plans. If the pipe is installed under a road, place the test station at the curb for easy access.
- B. Use continuous test station lead wires without cuts or tears in the insulation.

- C. Attach test lead wires to the pipe by exothermic welding.
- D. Use color coded test wires as indicated on the Plans.
- E. Wire test station terminal board configurations as shown on the Plans.
- F. Excavation and attachment of wires to foreign pipeline to be approved by and coordinated with the operator of the foreign pipeline. Foreign pipeline operator must be present if wire attachments are made.

3.02 PREPARATION (NOT USED)

3.03 ERECTION/INSTALLATION APPLICATION AND/OR CONSTRUCTION

- A. Required applications of corrosion control test stations include locations where future testing is anticipated for the following reasons:
 - 1. Testing to determine the effectiveness of the installed cathodic protection systems and to allow for startup adjustments.
 - 2. Testing to determine interference effects from and on adjacent or crossing foreign underground structures.
 - 3. Testing to determine sources and magnitude of stray d-c currents and required mitigative measures.
 - 4. Periodic monitoring to determine status of existing cathodic protection systems, stray current, and foreign line influence.
- B. Flush-Mount Test Stations
 - 1. Install flush-mount test stations as shown on the Plans.
 - 2. Install permanent copper/copper sulfate reference cell as specified in Paragraph 2.02.B of this document.
 - 3. Coil sufficient slack beneath the test station to allow for soil settlement and to prevent damage to the leads during backfilling. Leave additional slack to allow for withdrawal of the terminal board a minimum of 18 inches above the top of the concrete traffic box for test purposes.
 - 4. Set test stations outside areas of permanent paving in a Portland cement concrete pad, minimum of 24 inches square and no less than 4.5 inches thick.
- C. Above-Grade Test Stations
 - 1. Install above-grade test stations where shown on Plans.

2. Coil sufficient slack in the test station post ~~beneath the test station~~ to allow for soil settlement. Do not damage the leads during backfilling.

D. Permanent Reference Electrodes

1. Set test stations in a Portland cement concrete anchor, a minimum of 12 inches in diameter and no less than 2 feet thick. Top of concrete anchor shall be flush with final grade.
2. Install the permanent reference cell at all test station locations.
3. Remove the permanent reference cell from the shipping package. Totally submerge the reference electrodes in a 5-gallon bucket of potable water for a minimum period 15 minutes. Brackish water or saltwater will not be allowed. Measure the accuracy of each copper/copper sulfate reference electrode before installation by measuring the DC voltage difference between it and another reference electrode of known accuracy. The measurements shall be within the written DC voltage calibration as specified by the reference electrode manufacturer. Reference electrodes that do not comply with the manufacturer's stated calibration shall not be used. The reference electrode data shall be recorded and included in the as-built documentation submitted to the Owner.
4. Place below the springline and 6-inches from the pipeline.
5. Backfill the reference electrode with six inches of select, native soil and compact by hand. Moisten the soil, if necessary, for good compaction.

3.04 DEMONSTRATION / TESTING AND INSPECTION

A. Test Lead Wire Attachment

1. Attach test leads to the pipe by exothermic welding following the manufacturer's written instructions.
2. Clean and dry the pipe to which the wires are to be attached.
3. Remove all coating, mill scale, oxide, grease, and dirt from an area approximately 3 inches square to effect a bright metal surface.
4. Remove approximately 1 inch of insulation from each end of the wires to be exothermically welded to the pipe, exposing clean, oxide-free copper for welding.
5. Using the proper size exothermic weld mold and charge as recommended by the manufacturer, place the wire between the graphite mold and the prepared metal surface. Use a copper sleeve crimped over the wire for all No. 12 AWG wires.

6. Place the metal disk in the bottom of the mold.
7. Pour the exothermic weld charge into the mold. Squeeze the bottom of the cartridge to spread ignition powder over the charge, in case that it is consistent with the manufacturer specification.
8. Close the mold cover and ignite the starting powder with a flint gun.
9. After the exothermic reaction, remove the thermite weld mold and gently strike the weld with a hammer to remove the weld slag. Pull on the wire to assure a secure connection. If the weld is not secure or the wire breaks, repeat the procedure.
10. If the weld is secure, coat all bare metal and weld metal with 2-part epoxy.

B. Post Installation Backfilling and Testing of Test Station Lead Wires

1. Protect test station wires to prevent damage to the wire insulation and conductor integrity during backfilling.
2. After completion of the backfilling of the test wires to the pipe, verify the connection by recording:
 - a. pipe-to-soil potential
 - b. permanent to portable reference cell potential
 - c. continuity of pipe wires using ohmmeter test

Submit the documentation to the Engineer and Project Manager, including permanent reference cell testing per Paragraph 2.02.B of this document.

3. Replace any test wire found to have a high resistance connection.
4. Document location of test station including GPS and submit as part of as-built information to Project Manager.

END OF SECTION