

UNITED STATES DEPARTMENT OF AGRICULTURE  
NATURAL RESOURCES CONSERVATION SERVICE

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CONSTRUCTION SPECIFICATION  
CS-51: "CATHODIC PROTECTION"

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51.1 SCOPE

The work shall consist of furnishing and installing all materials necessary to provide cathodic protection to metal pipelines, tanks, structures and other buried ferrous metal structures. Only prepackaged anodes without induced current shall be provided under this specification.

51.2 MATERIALS

a. Anodes

The anodes shall be of the type and size specified. They shall be commercially cast and pre-packaged. Each anode shall have a full length core with a #12 AWG or larger insulated copper lead wire attached.

Zinc anodes shall conform to the requirements of ASTM B-418, Type II composition. Unless otherwise specified, the packaged backfill shall be 20-30 percent bentonite and 70-80 percent gypsum.

Magnesium anodes shall have a chemical composition of 5-7 percent aluminum, 2-4 percent zinc, 0.15-0.25 percent manganese, a maximum of 0.7 percent other varied elements, and the balance magnesium. The packaged backfill shall be approximately 75 percent hydrated gypsum, 20 percent bentonite, and 5 percent sodium sulfate.

b. Wire

The wire for header cables, anode leads, and joint bridging shall be a single conductor, standard, plain annealed copper with a black, high-molecular weight polyethylene insulation and jacket. The polyethylene shall conform to ASTM Designation D-1248, Type I, Class C, Grade 5.

Wire for header cables and anode leads shall be 12 AWG copper or larger. Wire for bridging joints shall be 6 AWG copper or larger.

c. Powder Weld Process

The welder and powder charge shall be of the size, type and composition recommended by the manufacturer for permanently fastening copper wire to copper wire or to steel or cast iron surfaces. The resulting weld shall be a permanent, low resistance copper connection.

d. Silver Solder Process

The silver solder process shall be for very low voltage electrical connections. Manufacturer's instructions shall be followed.

51.3 INSTALLING ANODES

Anodes shall be placed as shown on the drawings. They may be placed either horizontally or vertically and shall be deep enough to have at least three (3) feet of earth cover. Anodes shall not be placed in fill areas. Magnesium anodes shall be placed a minimum distance of 10 feet from the pipeline or structure.

Anodes shall be bedded in moist fine grained soils such as CH, CL, MH, or ML. In sandy and gravelly areas, fine materials must be imported for bedding and for covering the anodes to a depth of approximately 6 inches. The packaged anodes and the fine textured soils used for bedding and backfill shall be thoroughly wetted. Compaction of the backfill around anodes shall be the density of the surrounding material.

If the anode cannot be placed in a low or wet location, sand or gravel shall be used as backfill above the fine grained fill around and over the anode. The location of the anode shall be at least 6 inches lower and shaped to direct runoff to the anode.

51.4 ATTACHING THE ANODE

Unless otherwise specified, the lead wire from the anode, or from the header wire for multiple anode installations, shall be attached to the pipeline or structure by a powder welding process. In the area of the damaged pipe or structure coating the metal and the weld shall be covered with a coating equal in quality to the original of the metal.

Unless otherwise specified, the lead wires from anodes shall be connected to the header wire by a powder weld, brazed, or silver soldered. The connection shall be thoroughly cleaned and wrapped with vinyl electrical tape.

51.5 TESTING STATIONS

Testing stations shall be located and installed as specified on the drawings. All connections shall be as specified and shall be electrically insulated.