

## SECTION 19

### CATHODIC PROTECTION OF UTILITIES

#### 19.1 GENERAL

This specification details the installation of Cathodic Protection for steel pipe, fittings, valves, curb stops and hydrants. All steel appurtenances that are in areas where servicing of these items is under the road surface, shall be cathodically protected. **Cathodic Protection shall be included on all valves, hydrants, and appurtenances.**

#### 19.2 MATERIALS

##### 19.2.1 STEEL PIPE

a) All steel pipe shall be cathodically protected as per the Typical Detail Drawings with high potential magnesium anodes as specified below:

High Potential magnesium anodes shall have the following chemical composition:

- Al 0.02% maximum
- Mn 0.80% to 1.5% maximum
- FE 0.03% maximum
- Ni 0.002% maximum
- Cu 0.003% maximum
- Zn 0.02% maximum
- Other 0.001% maximum
- Mg Remainder

Perforated galvanized steel core not to exceed 0.15 kg per metre of core.

b) Lead wire No. 10AWG is to be 3 m long.

c) Permeable cloth bag, containing the anode and backfill material is to consist of:

- Ground Hydrated Gypsum 75%
- Powdered Wyoming Bentonite 20%

- Anhydrous Sodium Sulphate 5%

The grain size limits are:

- 100% passing the  $850 \times 10^{-6}$  m sieve size
- 50% or more retained by the  $150 \times 10^{-6}$  m sieve size

The mixture shall be firmly packaged around the anode by means of adequate vibration. Backfill material should be of sufficient quantity to cover all parts of the anode to a minimum thickness of  $25 \times 10^{-3}$  m. Anodes packaged in cloth bags shall be shipped in a plastic or heavy paper bag of sufficient thickness to permit normal handling without tearing.

d) Anodes may be packaged in cardboard tubes provided approval is received from the Municipal Engineer. Cardboard tubes shall conform to the following:

- 100 mm (4 inch) tubes, 3-ply, 4.3 mm (0.017 inch), absorption paper
- 150 mm (6 inch) tubes, 4-ply, 4.3 mm (0.017 inch), absorption paper

Cardboard tubes shall have devices to hold the anode in the centre of the tube. The size and type of anode shall be clearly marked on the container.

The shipping container shall be watertight plastic. The plastic shipping container is to be removed prior to installation. Anodes shall carry a label identifying the manufacturer, type of anode, metal and backfill composition, and the net weight of the anode.

### 19.2.2 BURIED FITTINGS, VALVES AND HYDRANTS

All buried fittings and valves shall be cathodically protected with 2.3 kg (5 lb) zinc anodes and all hydrants shall be cathodically protected with a 5.5kg (12 lb) zinc anodes as per the Typical Detail Drawing. Zinc anodes are to be supplied as specified below:

Zinc Anodes shall conform to ASTM B418-73 Type II and shall have the following composition:

- Aluminum 0.005% maximum
- Cadmium 0.003%

- Iron 0.001%
- Zinc remainder

The packaged zinc anode shall be supplied with 2 m of AWG #10/7 copper wire.

The shipping container shall be watertight plastic and is to be removed prior to installation. Anodes shall carry a label identifying the manufacturer, type of anode, metal and backfill composition, and the set weight of the anode.

### 19.2.3 EXTERIOR BOLTS ON VALVES, HYDRANTS AND COUPLINGS

All exterior bolts on valves, hydrants and couplings shall be Stainless Steel 304 or approved equivalent.

## 19.3 **INSTALLATION**

### 19.3.1 STEEL PIPE

a) Based upon a soil resistivity analysis conducted along the length of the pipeline, the Contractor shall install the weight and spacing of anodes as shown on the Typical Detail Drawings.

b) Watermain

Use at least one 7.7 kg (17 lb) magnesium anode at each end of water main as specified by the Municipal Engineer.

Wires shall be connected to steel pipes and fittings with a cadweld.

Magnesium anodes shall be installed as per the Typical Detail Drawing.

A minimum of 10L (2 gallons) of water shall be poured on each anode to initiate the anode's operation.

c) Test Stations

The Contractor shall provide test wire leads No. 10 AWG solid copper wire with CSA Type TWH or better insulation. The lead wire shall be wrapped and soldered to the anode core according to the manufacturer's standard practice. The connection shall be stronger than the wire and shall be completely insulated with electrical potting compound. The lead wire is to be coiled for protection during handling.

Test stations shall be in accordance with the Typical Detail Drawings.

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Test points should be installed at all isolation locations with one lead bonded on each side of the isolator so that isolation integrity can be checked.

### 19.3.2 BURIED FITTINGS, VALVES AND HYDRANTS

A minimum of 2 L (0.5 gallon) of water is to be poured on each 2.3 kg (5 lb) anode and 3 L (0.75 gallons) on 5.5 kg (12 lb) anode to initiate the anode operation. An alternative is to soak the above anodes in water for a minimum of 10 minutes.

### 19.3.3 CONNECTIONS TO EXISTING PIPES

All old steel, cast iron, or ductile iron being connected to must have at least two 7.7 kg (17 lb) magnesium anodes at point of connection as specified by the Municipal Engineer.

## **19.4 TESTING REQUIREMENTS OF THE CONTRACTOR**

### 19.4.1 PRE-INSTALLATION

#### a) Materials

None required.

#### b) System

The Contractor shall undertake whatever testing is necessary to safeguard and protect existing utilities and structures.

### 19.4.2 INSTALLATION

#### a) Materials

None required.

#### b) System

None required.

### 19.4.3 POST-INSTALLATION

#### a) Materials

None required.

b) System

Where test stations have been installed, the contractor will provide test data to verify that the Cathodic protection systems are providing the required level of protection. This information shall be provided on an annual basis during the warranty period until the work has received Final Acceptance.

**19.5 PAYMENT**

**19.5.1 CATHODIC PROTECTION**

Payment for Cathodic Protection is to be considered incidental to the installation of all steel pipe, fittings, valves, curb stops and hydrants. No additional payment will be made for this item.

**19.5.2 TESTING REQUIREMENTS OF THE CONTRACTOR**

There shall be no payment for Testing required by the Contractor.

Adopted: November 2007

