PROCEDURES
CATHODIC PROTECTION / GENERAL

1.0 PURPOSE (Part 192, Subpart I)

Corrosion is the tendency of metal to return to its natural state caused by a chemical reaction between the pipe and its surrounding elements.

It is the purpose of this section to provide the activities, methods and installation requirements necessary for corrosion control of the metallic gas piping system.

1.1 SCOPE

This section covers the following:

A. CP and CP Requirements

B. CP Inspections

C. Cathodic Protection System

D. Connection to pipe

E. Protective Coating

F. Pipe-to-Soil Potentials

G. Close Interval Survey

1.2 GENERAL

Corrosion of buried metal structures occurs where electrical currents flow from the pipe to the surrounding soil, in the case of submerged pipe to the surrounding body of water or in the case of above ground structures to the surrounding atmosphere. These currents cause molecules of the metal to disband from the pipe. This corrosion may eventually result in the loss of sufficient metal to weaken the pipe or pipeline facility causing adverse effects on the MAOP or even in the complete pipe penetration with a resulting gas leak.

Corrosion control is an essential component in the safe operation of gas pipeline and pipeline facilities containing steel and / or other metallic components. Adequate cathodic protection is an important component of maintaining pipeline integrity.

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Two primary methods of Cathodic Protection (CP) shall be implemented.

1. Protective Coating: Coating applied to the pipe prior to installation, and maintained during the life of the pipeline facilities.
2. CP System: CP systems are an electrical means of mitigating corrosion on buried metallic structures, primarily steel; sacrificial anodes or impressed current. Each method employs galvanic anode cathodic protection; current is obtained from a metal of a higher energy level.

1.2 CORROSION

A. A corrosion cell consists of:
   1. Anode
   2. Cathode
   3. Electrolyte
   4. Electrical Connection

B. Causes of corrosion:
   1. Dissimilar metals
   2. Dissimilar fabrication
   3. Dissimilar soil environments
   4. Dissimilar pipe ages
   5. Dissimilar surface conditions
   6. Stray DC ground voltage

1.3 GENERAL REQUIREMENTS

The purpose of cathodic protection is to force the entire metal surface to be cathodic to the environment. Metal piping shall be protected against the effects of corrosion.

A. Each piping system with separate CP systems shall be electrically separated (isolated) by the use of insulators.

B. Aboveground (exposed) piping shall be protected by the use of coating specifically designed for aboveground use (UV protective). Most commonly used is paint. This will place a barrier between the pipe and the outside elements (moisture).
   - Aboveground piping shall be evaluated once every 3 years for atmospheric corrosion.
   - Aboveground coatings should **not** be utilized for underground installations.

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C. Underground (buried) piping shall be coated or wrapped and protected from the affects of rust and corrosion.
   - Underground coating shall **not** be used on aboveground installations unless it contains ultraviolet inhibitors to prevent the deterioration of the coating when exposed to sunlight

D. Pipe-to-soil readings shall be taken on all underground piping once each calendar year not to exceed 15 months. Reading is measured with the use of a voltmeter and a reference half-cell (copper-copper sulfate cell).

E. CP readings shall be a minimum of – 0.85 volts (negative 850 millivolts) to demonstrate adequate cathodic protection for the underground pipeline facilities. Readings shall be taken at a sufficient number of locations and near the midpoints between anodes to assure that the steel piping is being adequately protected.

F. When a rectifier is in use, the rectifier shall be inspected 6 times each calendar year at intervals not to exceed 2 ½ months.

G. Whenever a portion of a buried metal pipeline is exposed, it shall be inspected for external corrosion and coating deterioration.

E. Whenever possible (pipe is cut, or tapping coupons), but less that twice each year, the interior surface of the pipe shall be inspected for the affects of internal corrosion.

F. C.P. records shall be maintained for as long as the pipeline remains in service.

G. C.P. test stations shall be spaced sufficiently to adequately determine C.P. protection.