PROCESS INDUSTRY PRACTICES

June 2018

***Pipeline Systems***

# PIP PLE00006
# Cathodic Protection Systems for Pipelines

PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

This Practice is subject to revision at any time.



**PUBLISHING HISTORY**

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## 1. Scope

This document provides guidance for the design and installation of cathodic protection systems to control and minimize external and internal corrosion of metallic pipelines buried or immersed in an electrolyte (e.g. an aqueous or soil environment). Appendix A contains well construction information. Appendix B contains typical installation details.

## 2. References

Applicable parts of the following industry codes and standards shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles are used herein where appropriate. Code section references below are specific to the code editions in effect at the issuance of this Practice.

### Industry Codes and Standards

- Institute of Electrical and Electronics Engineers (IEEE)
  - IEEE 81 - *Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System*
- International Organization for Standardization (ISO)
  - ISO 15589-1 - *Petroleum and Natural Gas Industries – Cathodic Protection of Pipeline Transportation Systems – Part 1: On-land Pipeline*
- National Association of Corrosion Engineers (NACE)
  - NACE RP0169 - *Control of External Corrosion on Underground or Submerged Metallic Piping Systems*
  - NACE SP0286 - *Electrical Isolation of Cathodically Protected Pipelines*

### Other References

- A. W. Peabody - *Control of Pipeline Corrosion*

## 3. Definitions

*anode:* Electrode through which current flows into the electrochemical cell and through which negatively charged electrons flow to the external circuit. As such, the location at which oxidation or corrosion of the component occurs.

*cathode:* Electrode of an electrolytic cell at which reduction, the complementary process to oxidation, is the principal reaction. Also, the recipient of negatively charged electrons from the anode.

*cathodic protection (CP):* (1) Decrease of corrosion rate by shifting the corrosion potential of the electrode toward a less oxidizing potential by applying an external electromotive force; (2) Partial or complete protection of a metal from corrosion by making it a cathode, using either a galvanic anode or a DC impressed current.