

GENERAL INSTRUCTION MANUAL

428.001

ISSUING ORG. CONSULTING SERVICES DEPARTMENT

ISSUE DATE

06/07/2010

REPLACES

07/07/2001

SUBJECT CATHODIC PROTECTION RESPONSIBILITIES

APPROVAL

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1 PURPOSE

The purpose of this General Instruction 428.001, Cathodic Protection Responsibilities, is to define the responsibilities for effective design, construction, inspection, commissioning, operating, and monitoring of Saudi Aramco cathodic protection installations.

2 CONSULTING SERVICES DEPARTMENT/CATHODIC PROTECTION GROUP RESPONSIBILITIES

- 2.1 The Consulting Services Department/Cathodic Protection Group (CPG) shall revise Saudi Aramco Engineering Standards (SAES-X series) and index "X" Standard Drawings, as improved materials and techniques in cathodic protection become available. The CPG shall also review existing material specifications, revise or issue SAMSS's and review SAMSS and spare stock levels. Input from Operations, Maintenance and Project Management shall be solicited before these revisions are made.
- 2.2 The CPG shall review all project proposals containing cathodic protection installations and attend project review meetings and shall ensure compliance with CP SAES and standard drawings requirements for cathodic protection.
- 2.3 The CPG shall participate in preliminary and final design review meetings with the project team and shall review and approve the detailed design drawings.
- 2.4 The CPG shall analyze monitoring and survey data and provide training for personnel involved in maintenance, operations, monitoring and survey of cathodic protection systems.
- 2.5 The CPG shall provide assistance in commissioning of new cathodic protection systems when requested by the proponent or Saudi Aramco Project Management Team.
- 2.6 At the request of a CP operations proponent organization, the CPG will analyze the periodic CP operating and survey records and will provide recommendations for improvements on system operation and maintenance and provide design basis for system upgrading when required.

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- 2.7 The CPG and the proponent shall assist the project team in defining and interpreting Saudi Aramco Standard design requirements for cathodic protection on all projects.
- 2.6 At the request of the project team, the CPG shall assist in verifying the qualification of the engineer(s) designing cathodic protection systems and installations.

3 PROJECT MANAGEMENT ADMINISTRATIVE AREA RESPONSIBILITIES

- 3.1 The Project Management Administrative Area shall be responsible for providing adequate cathodic protection design and timely installation schedules for the protection systems in accordance with the CP SAES's and the approved project proposal. The Saudi Aramco Project Management Team (SAPMT) shall ensure that the engineer(s) designing cathodic protection from engineering firms or Saudi Aramco have at least the following qualifications:
- a. BSc in Engineering, preferably Electrical Engineering.
 - b. Five (5) years of documented experience in the design of cathodic protection systems.
- 3.2 All cathodic protection installations shall be designed in accordance with the requirements of Saudi Aramco Cathodic Protection Standards, of the SAES-X series, and standard drawings. SAPMT shall verify that the design contractor has access to the SAES's, SAMSS's, and Standard Drawings in effect at the time of contract award.
- 3.3 The project engineer is responsible for retaining all required field-data including, but not limited to, CP design calculations, cathodic protection current requirements, soil resistivities, anode bed types and existing cathodic protection systems. These data shall be given to the proponent upon completion of the project.
- 3.4 The SAPMT is responsible for pre-commissioning of each individual piece of CP equipment. This includes turning on the rectifiers and solar systems and verifying that each anode is properly connected. The proper forms of SAEP-332 "Cathodic Protection Commissioning" Appendix A to K, verifying the proper installation and operation of the new CP system(s) shall be filled and submitted to the facility proponent department.
- 3.5 The SAPMT shall advise the proponent and the project inspection group of installation work and commissioning schedules.
- 3.6 Prior to processing the mechanical completion certificate (MCC) in accordance with GI-2.710 "Mechanical Completion and Performance Acceptance of Facilities", the SAPMT shall supply as-built drawings and all records pertaining to all cathodic protection installations to the Proponent.

4 INSPECTION DEPARTMENT RESPONSIBILITIES

- 4.1 The Inspection Department shall provide periodic independent Quality Assurance audits to ensure the integrity and reliability of Cathodic Protection installations in Saudi Aramco facilities.
- 4.2 The Inspection Department shall monitor project progress to verify compliance with the approved construction drawings, materials specifications, scope-of-work and all Saudi Aramco Engineering Standards according to Saudi Aramco Engineering Procedure SAEP-1150.

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- 5.1 The proponent operating organizations shall review all project proposals and approve all cathodic protection designs and drawings in their area of responsibility. Before starting the project proposal, the proponent shall also advise SAPMT whether the existing cathodic protection systems are sufficient or need augmentation for the additional facilities and equipment that will be installed.
- 5.2 The proponent operating organizations, with the help of SAPMT, shall be responsible for commissioning all new cathodic protection systems. Commissioning procedures are specified in SAEP-332.
- 5.3 The proponent operating organizations shall issue work sheets for maintenance related repairs on existing cathodic protection systems.
- 5.4 The proponent operating organizations shall be responsible for upgrading systems that require additional current capacity to maintain the level of protection specified in SAEP-333.
- 5.5 The proponent operating organizations shall conduct periodic inspections of all cathodic protection systems as specified in SAEP-333.
- 5.6 The proponent operating organizations shall operate and record performance of all cathodic protection installations within their jurisdiction, and inform proponent operations engineering groups where malfunctions or other problems are found.
- 5.7 Proponent organizations shall ensure operating, monitoring, and maintaining all CP systems on their mothballed facilities and suspended wells.
- 5.8 Proponent organizations shall define and agree on the boundaries of CP responsibilities between their facilities. Each organization shall also coordinate with the other organizations any changes on the CP potential levels on its facilities that could affect the CP potential levels on the other organizations' facilities.
- 5.9 The term "monitoring" in the following sections is understood to include not only checking to determine the effectiveness of the systems, but to initiate the appropriate action for remedial measures when the criteria set forth in SAEP-333 has not been met.

6 REFERENCES

6.1 Saudi Aramco Engineering Standards:

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| 6.1.1 | SAES-X-300 | Cathodic Protection of Marine Structures |
| 6.1.2 | SAES-X-400 | Cathodic Protection of Buried Pipelines |
| 6.1.3 | SAES-X-500 | Cathodic Protection of Vessel and Tank Internals |
| 6.1.4 | SAES-X-600 | Cathodic Protection of Plant Facilities |
| 6.1.5 | SAES-X-700 | Cathodic Protection of Onshore Well Casings |

6.2 Saudi Aramco Engineering Procedures:

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| 6.2.1 | SAEP-332 | Cathodic Protection Commissioning |
| 6.2.2 | SAEP-333 | Cathodic Protection Monitoring |
| 6.2.3 | SAEP-1150 | Inspection Coverage on Projects |

6.3 General Instructions:

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| 6.3.1 | GI-2.710 | Mechanical Completion and Performance Acceptance of Facilities |
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Notes:

1. Cathodic protection for tanks should include the internal surfaces and the external bottom.
2. Cathodic protection for vessels only includes the internal surfaces.

Recommended by
Manger, Consulting Services Department

Concurred by
Manager, Inspection Department

Approved by:

Vice President, Project management