Training Course on Cathodic Protection System in Oil and Gas Exploration Industry

Professional Development Training Course Outline

Category	Oil and Gas	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The integrity of infrastructure is paramount in the demanding **oil and gas exploration industry**, where corrosion poses a significant threat to pipelines, storage tanks, and offshore structures. Implementing robust **cathodic protection systems** is not merely a regulatory requirement but a crucial strategy for ensuring operational safety, environmental protection, and long-term asset value. This comprehensive training course provides participants with an in-depth understanding of the principles, design, installation, operation, and maintenance of these vital systems. By mastering the concepts of **electrochemical corrosion control** and various **CP techniques**, professionals can effectively mitigate the risks associated with corrosion, leading to substantial cost savings and enhanced operational efficiency within the **energy sector**.

This specialized program delves into the intricacies of **corrosion mechanisms** prevalent in the oil and gas environment and equips participants with the practical skills needed to implement and manage effective **corrosion prevention strategies**. Through a blend of theoretical knowledge and real-world case studies, attendees will gain expertise in selecting appropriate **cathodic protection methods**, conducting site assessments, interpreting monitoring data, and ensuring compliance with industry standards. The course emphasizes the importance of **asset integrity management** and the role of properly functioning CP systems in achieving sustainable and safe operations in the **upstream oil and gas** sector.

Programme Curriculum

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Course Objectives

1. Understand the fundamental principles of **electrochemical corrosion**.
2. Identify the various forms of **corrosion in oil and gas infrastructure**.
3. Explain the theory and application of **sacrificial anode cathodic protection**.
4. Describe the theory and application of **impressed current cathodic protection**.
5. Learn to conduct **site surveys for cathodic protection system design**.
6. Develop skills in selecting appropriate **CP system components**.
7. Understand the principles of **cathodic protection design calculations**.
8. Gain knowledge of **CP system installation best practices**.
9. Learn to perform **routine monitoring and maintenance of CP systems**.
10. Interpret **cathodic protection monitoring data and reports**.
11. Understand relevant **industry standards and regulations for CP**.
12. Troubleshoot common issues in **cathodic protection system operation**.
13. Recognize the importance of **integrated corrosion management strategies**.

Organizational Benefits

- Reduced operational downtime due to corrosion-related failures.
- Extended lifespan of critical oil and gas assets.
- Minimized maintenance and repair costs associated with corrosion.
- Improved safety and environmental performance.
- Enhanced regulatory compliance and reduced liability.
- Increased asset integrity and reliability.
- Development of in-house expertise in cathodic protection.
- Better informed decision-making regarding corrosion control investments.
- Enhanced reputation for operational excellence.
- Contribution to sustainable and responsible energy production.

Target Audience

1. Corrosion Engineers

2. Pipeline Integrity Engineers
3. Maintenance Engineers
4. Project Engineers
5. Inspection Personnel
6. Technical Managers
7. HSE Professionals
8. Anyone involved in the design, operation, and maintenance of oil and gas infrastructure.

Course Outline

Module 1: Fundamentals of Corrosion

- Electrochemical nature of corrosion.
- Types of corrosion: uniform, pitting, galvanic, stress corrosion cracking, etc.
- Factors influencing corrosion rates (environment, materials, etc.).
- Corrosion in specific oil and gas environments (soil, seawater, atmosphere).
- Economic impact of corrosion in the oil and gas industry.

Module 2: Introduction to Cathodic Protection

- Principles of cathodic protection.
- Polarization and its significance in CP.
- NACE and other relevant standards for CP.
- Overview of sacrificial anode and impressed current CP systems.
- Criteria for effective cathodic protection.

Module 3: Sacrificial Anode Cathodic Protection (SACP)

- Theory and mechanism of SACP.
- Types of sacrificial anodes (zinc, magnesium, aluminum).
- Anode selection criteria and design considerations.
- Installation and connection methods for sacrificial anodes.
- Maintenance and monitoring of SACP systems.

Module 4: Impressed Current Cathodic Protection (ICCP)

- Theory and mechanism of ICCP.
- Components of an ICCP system (rectifier, anodes, cables).
- Types of ICCP anodes and their applications.
- Design considerations for ICCP systems.
- Installation and commissioning of ICCP systems.

Module 5: Site Surveys and Data Collection

- Importance of site surveys for CP design.
- Soil resistivity measurements and interpretation.
- Environmental data collection (pH, salinity, temperature).
- Potential measurements and their significance.
- Data logging and analysis techniques.

Module 6: Cathodic Protection Design Principles

- Current requirement calculations.
- Anode placement and distribution.

- Considerations for different types of structures (pipelines, tanks, offshore).
- Stray current interference and mitigation.
- Design software and tools.

Module 7: Installation and Commissioning of CP Systems

- Best practices for anode and cable installation.
- Electrical connections and testing procedures.
- Rectifier setup and adjustment.
- Commissioning procedures and documentation.
- Safety considerations during installation.

Module 8: Monitoring and Maintenance of CP Systems

- Routine inspection procedures.
- Potential measurements and interpretation.
- Current output monitoring.
- Troubleshooting common CP system issues.
- Record keeping and reporting requirements.

Module 9: Cathodic Protection of Pipelines

- Specific challenges in pipeline corrosion.
- External and internal corrosion control methods.
- CP design considerations for pipelines.
- Pipeline coating and its role in CP.
- Monitoring and maintenance of pipeline CP systems.

Module 10: Cathodic Protection of Storage Tanks

- Corrosion mechanisms in storage tanks (bottom, shell, roof).
- CP design for aboveground and underground tanks.
- Internal cathodic protection methods.
- Monitoring and inspection of tank CP systems.
- Considerations for different tank types and contents.

Module 11: Cathodic Protection of Offshore Structures

- Unique challenges of offshore corrosion.
- CP design for submerged and splash zones.
- Types of anodes used in offshore applications.
- Remote monitoring techniques.
- Maintenance and inspection in the offshore environment.

Module 12: Stray Current Interference

- Sources of stray currents (DC transit systems, welding).
- Effects of stray current on buried structures.
- Methods for identifying and mitigating stray current interference.
- Bonding and grounding techniques.
- Cooperative testing and mitigation agreements.

Module 13: Industry Standards and Regulations

- Overview of relevant NACE standards.
- API and other industry guidelines.
- Environmental regulations related to corrosion control.
- Compliance requirements for CP systems.
- Documentation and record-keeping standards.

Module 14: Advanced CP Techniques and Technologies

- Remote monitoring systems.
- Wireless sensor networks for CP.
- Cathodic protection modeling and simulation.
- Intelligent pigging for corrosion assessment.
- Emerging technologies in corrosion control.

Module 15: Case Studies and Best Practices

- Real-world examples of successful CP implementation.
- Analysis of corrosion failures and lessons learned.
- Best practices for CP system design, installation, and maintenance.
- Economic benefits of effective cathodic protection.
- Future trends in cathodic protection for the oil and gas industry.

Training Methodology

The course will employ a blended learning approach incorporating:

- Interactive lectures and presentations.
- Case studies and real-world examples.
- Group discussions and problem-solving exercises.
- Practical demonstrations and simulations (where feasible).
- Quizzes and assessments to reinforce learning.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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