



Cathodic Protection

Course Introduction:

Maintaining the ageing infrastructure such as underground pipelines is a challenge to the oil and gas industry worldwide. Understanding why and how cathodic protection works or fails can help the operator formulate appropriate strategy in managing the pipeline corrosion problems.

Cathodic Protection (CP) is a technique used to control the corrosion of a metal surface by making it the cathode of an electrochemical cell. Cathodic protection systems protect a wide range of metallic structures in various environments. Common applications are: steel water or fuel pipelines and steel storage tanks such as home water heaters; steel pier piles; ship and boat hulls; offshore oil platforms and onshore oil well casings; offshore wind farm foundations and metal reinforcement bars in concrete buildings and structures. Cathodic protection designs can differ considerably depending upon the coating, the configuration of the structure, the environment and the presence of neighboring structures. When a system is designed, installed and maintained properly, cathodic protection is one of the most effective and economical methods of preventing corrosion.

This course covers both the fundamentals and practices in designing, operating and maintaining cathodic protection of underground pipelines. Also, provide participants with an understanding of why and how corrosion occurs, the metallurgical and environmental factors influencing pipelines corrosion underground, and practical methods of corrosion control and failure prevention to manage the pipelines corrosion problems.

Course Objectives:

Upon successful completion of this course, the delegates will be able to:

- Gain an in-depth technical knowledge of cathodic protection methodology
- Understand cathodic protection system design and the associated parameters
- Understand principles of corrosion and corrosion Control
- Monitoring and Management of CP protected structures
- Learn how cathodic protection works
- Understand the effectiveness of pipeline coatings
- Know the different type of pipeline coatings
- Carry out coating failures analysis
- Identify and understand the sacrificial anode cathodic protection
- Identify and understand the impressed current cathodic protection
- Know well the Criteria for cathodic protection
- Gain deep knowledge on the instrumentation used for cathodic protection of underground pipelines
- Understand the importance of regular inspection and maintenance

- Conduct pipeline inspection using survey methods and evaluation techniques
- Learn the NACE Standard on pipeline external corrosion direct assessment methodology

Who Should Attend?

This course intended for:-

- Cathodic Protection Design & Engineer
- Operation & Maintenance persons of Cathodic Protection
- CP Inspection and Survey
- Oil and Gas Production and Processing
- Oil Refineries
- Petrochemicals
- Fertilizer
- Infrastructure Companies
- Power Plants
- Chemical & process industries
- Pipeline
- Design & Engineering Companies
- Equipment Suppliers
- Technical Institutes
- Vendors & Suppliers of CP Product

Course Outline:

المركز العالمي للتدريب والتطوير
International Centre For Training & Development

1st Day

Registration

Welcome & Introduction

Pre-Test

- Primer on Chemistry and Metallurgy
- Cathodic protection fundamentals
 - Nature of corrosion cell
 - Electrochemical theory behind cathodic protection (CP)
 - CP & corrosion rate
 - Types of CP (sacrificial vs. Impressed current)
 - CP reactions, coatings & CP
 - Cathodic disbondment
 - CP current density and potential etc.

- Sacrificial Anode Cathodic Protection
 - Anode materials
 - Anode design
- Impressed Current Cathodic Protection
 - Consumable ICCP Anodes
 - Permanent ICCP Anodes
 - Power Sources
 - Cables and Connections
- Criteria for Cathodic Protection
- Instrumentation for Cathodic Protection of Underground Pipelines
 - Reference potential devices
 - Potential measuring instrument
 - Soil resistivity test instruments
 - Wall thickness and pit gages
 - Current interrupters
 - Test rectifiers
 - Holiday detectors
- Stray Current Corrosion and Methods of Prevention
 - Stray current corrosion and electrolysis
 - Practical stray current problems
 - Interference from other CP installations
- Cathodic Protection and Coatings
- Pipeline Inspection: Survey Methods and Evaluation Techniques
 - Survey methods for pipeline not under cathodic protection
 - Survey methods for pipeline under cathodic protection
- Surface Preparation and Coating Application
- Coatings Used in Conjunction with Cathodic Protection
 - Fusion Bond Epoxy (FBE)
 - Multilayer
 - Coatings and Extruded Polyolefins
 - Coal-Tar Enamel and Asphalt Enamel
 - Liquid Epoxies
 - Tape Coatings
 - Petrolatum and Wax
 - Shrink Sleeves
 - Mastics, Urethanes, and Polyureas; Abrasion-Resistant Coatings; and Cement Coatings
- Synergistic Effects between Coatings and Cathodic Protection.

- Methods of coating applications.
- Coating Performance and inspection Testing
- Coating defects and failure
- Coating repair

Last Day

Post-Test

Presentation of Certificates

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionnaires
- Group Work
- Discussion
- Presentation

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session