

# CORROSION CONTROL IN GAS, OIL AND WATER

## MCE070

### COURSE DESCRIPTION

Often the production of gas and oil is accompanied by water from the formation, condensation, or water injected as lift assist. Also, acid gases, are often present in produced fluids, and oxygen is sometimes a contaminant in the water used for injection. These acid gases increase the corrosivity of the waters to steel, and can significantly impact the safe operating life of production tubulars and equipment, production vessels, and transportation systems.

The problem of controlling corrosion can be complicated as a result of the presence or absence of multiple phases (gas, water, and oil or condensate) in the same system. Internal corrosion in a tubing string, vessel, or pipeline can have a significant impact on corrosivity and is influenced by conditions such as temperature, the flow regime or pattern of fluids, water wetting and composition and surface condition of the steel in a tubing string, vessel, or pipeline can have a significant impact on corrosivity.

This course covers an overview of process units and specific process descriptions, and focuses on the examination and identification of metallurgical problems that occurs in process units and methods of monitoring and damage reduction.

### COURSE GOAL

To enhance the participants' knowledge, skills, and abilities necessary to understand and apply corrosion principles and mechanisms in Oil, Gas, and Water.

### COURSE OBJECTIVES

By the end of this training course, participants will learn to:

- Understand the principles of corrosion and its mechanisms.
- Determine types of corrosion, related to oil, gas and water.
- Understand the application of corrosion protection techniques.
- Be familiar with basic metallurgical considerations and Materials of Construction for corrosion resistance.
- Recognize and define corrosion for applications and equipment related to oil, gas and water.
- Apply corrosion inspection and monitoring techniques and methods of corrosion mitigation.

### WHO SHOULD ATTEND

- Design Engineers
- Process Engineers
- Inspectors and Inspection Supervisors

- Maintenance Engineers and Planners
- Equipment Engineers
- Service Company Representatives

## **COURSE DURATION**

5 Working Days

## **COURSE OUTLINES**

### **1. Corrosion Principles**

- Introduction to corrosion and corrosion failure potential
- Requirements of corrosion
- Electro chemical cells
- Corrosion mechanisms
- Corrosion rates
- Worked examples

### **2. Types of Corrosion Related to Oil, Gas and Water**

- Uniform corrosion
- Pitting Corrosion
- Erosion Corrosion
- Crevice Corrosion
- Corrosion Under Lining
- Bimetallic Corrosion
- H<sub>2</sub>S, CO<sub>2</sub>, influenced corrosion
- Types of Hydrogen related cracking
- Naphthenic Acid Corrosion
- Carbonate Cracking (CC)
- Chlorine Stress Corrosion Cracking
- Microbiologically Induced Corrosion (MIC)

### **3. Materials of Construction for Refinery Applications**

- Common Materials in the Refinery Industry
- Carbon and alloy Steels
- Stainless steels
- Nickel based alloys
- Polymeric materials
- Selecting the proper material for the application

#### 4. Corrosion Control, Protection and Monitoring

- Cathodic protection
- Coatings and linings
- Inhibitors
- Corrosion coupons and probes
- Intelligent Pigs
- Overview of API 579

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