

COURSE OVERVIEW FE0270 Modern Cathodic Protection Systems

Design, Installation, Testing & Repair

Course Title

Modern Cathodic Protection Systems: Design, Installation, Testing & Repair

Course Date/Venue

Session 1: June 15-19, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Session 2: November 02-06, 2025/Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA



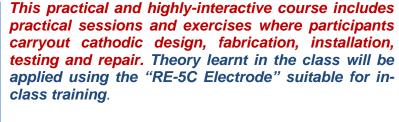
FE0270

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description







This course is designed to provide participants with a solid grounding in cathodic protection engineering. It provides theoretical knowledge and fundamentals for testing on both sacrificial and impressed current systems. It covers the cathodic protection systems for a wide range of industrial structures including buried and subsea pipelines, storage tanks, petrochemical plants and concrete structures.



The course is based on NACE International Standard Practices and NACE Official Cathodic Protection Technical Publications.

The course involves lectures and case studies describing equipment and instruments used in Cathodic Protection testing and In-Line current monitoring using new technology Cathodic Protection Current Measurement tool (CPCM).

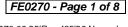






















Course Objectives

Upon the successful completion of this course, each participant will be able to: -

- Apply systematic techniques on the design, installation, testing and repair of modern cathodic protection systems
- Recognize the nature of corrosion, forms of corrosion and the various effects of soil condition and system operation
- Carryout cathodic protection and measurement and recognize their importance in the effectiveness of cathodic protection system
- Identify the associated aspects of corrosion control such as the materials selection, coatings and sacrificial cathodic protection including its design, types, selection and fabrication
- Discuss offshore cathodic protection design, operational integrity impact in offshore structures, CP anodes retrofitting forecast and replacement programs
- Discuss impressed current cathodic protection including their design, use and application
- Illustrate cathodic protection system design for tanks and explain the secondary containment, double bottom tanks and its monitoring issues
- Apply the impressed current cathodic protection design used in plants and explain stray current interaction with other structures
- Identify the corrosion and corrosion control present in reinforced concrete and employ the proper monitoring procedures of cathodic protection systems
- Employ the specialized survey techniques used in the evaluation of data for cathodic protection and demonstrate cathodic monitoring programmes
- Illustrate the technique of in-line cathodic protection current measurement (CPCM) to evaluate CP efficiency and possible interference currents as well as cathodic protection rectifiers

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive "Haward Smart Training Kit" (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes electronic version of the course materials conveniently saved in a Tablet PC.

Who Should Attend

This course provides an overview of all significant aspects and considerations of cathodic protection for those who are responsible for cathodic protection systems, measuring the effectiveness of cathodic protection systems and/or recording this data, including pipeline design engineers, pipeline operations engineers, corrosion engineers, materials engineers, design engineers, mechanical engineers, inspection engineers, chemical engineers, marine maintenance people, offshore structure design and operation people, CP field personnel, supervisors and other technical staff.

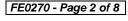
















Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -



The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the ANSI/IACET 2018-1 Standard which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the ANSI/IACET 2018-1 Standard.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking Continuing Education Units (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award 3.0 CEUs (Continuing Education Units) or 30 PDHs (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.



British Accreditation Council (BAC)

Haward Technology is accredited by the British Accreditation Council for Independent Further and Higher Education as an International Centre. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

Course Fee

US\$ 5,500 per Delegate + VAT. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

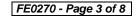














Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Salah Younes is a Senior Pipeline & Corrosion Engineer with over 30 years of extensive onshore & offshore experience within the Oil, Gas, Refinery and Petrochemical industries. His wide expertise covers in the areas of Inspection and Corrosion Foundations, Pipeline Inspection, Corrosion & Repair, LP/HP Gas, Condensate & Fuel Production, Corrosion Control, Corrosion Mechanism & Chemical Reactions, Corrosion Prevention & Control Techniques, Corrosion Management & Monitoring, Corrosion Inhibitors, Corrosion Analysis & Remedial Actions, Corrosion Inspection,

Facility Integrity Assessments & Rehabilitation, Production Corrosion Control, Cathodic Protection Testing, Painting Inspection, Pipeline Integrity Management, Pipeline Pigging & Assessment, Pipeline Design, Facility Integrity & Assessment, Risk Based Inspection, Process Piping, Storage Tanks, Tank Farm Piping Network, Pigging, ANSI/ASME B31, Pressure Vessels Design & Fabrication, Offshore Structure & Facilities, Onshore Facilities & Storage Tanks, Pressure Vessels, Inhibitors, Protective Coatings, Water Treatment & Injection, Water Flooding, Chemical Treatment & Injection, Oil & Gas Process and Steel Structure Painting. Further, his expertise includes soil resistivity, platform structures, atmospheric tanks, safety relieves valves, heat exchangers, fire heaters, fireproofing materials, lifting equipment, tubing, casing and gas lifting systems, fabrication yards, coatings & non-metallic materials, external & internal coatings, linear polarization and hot tapping. Currently, he is the Engineering General Manager wherein he prepares and follow-up periodical inspection plans for all plant equipment internally and externally during downtime and/or maintenance programs at oil processing plant, gas plant, water flooding plant and production platforms.

Earlier in Mr. Salah's career, he acquired his practical and technical expertise and held key positions as the Engineering Manager, Corrosion Department Manager, Facilities Integrity Manager, Corrosion Specialist, Offshore Engineer, Pipeline Integrity Consultant, Corrosion & Chemical Treatment Head, Coating Engineer, Corrosion Engineer, Chemical Engineer, Lecturer/Trainer and Senior Consultant from international companies like the ADMA-OPCO, Qatar Petroleum (QP), RASGAS, MAERSK Oil Qatar, GUPCO and Bureau Veritas.

Mr. Salah has a **Bachelor** degree in **Chemical Engineering**, a **Post Graduate Diploma** in **Chemical Engineering** and a **Diploma** in **Corrosion & Water Treatment**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership and Management** (**ILM**), a **Certified BGAS-CSWIP Painting Inspector** and a **Certified ASNT-NDT Level II** in Magnetic Particles Testing (**MT**), Penetrant Testing (**PT**) and Radiographic Testing (**RT**). Moreover, he has published various technical papers related to Corrosion Management and Cathodic Protection that have been presented at several international courses and conferences and has delivered numerous trainings, courses, seminars, conferences and workshops globally.

Dr. Faysal has a PhD, Master's and Bachelor's degree in Engineering from the University of British Columbia (Canada). He is a Certified Instructor/Trainer, a member of the Chamber of Civil Engineers, Structural Stability Research Council, American Institute of Steel Construction and American Society of Civil Engineers (ASCE), USA. He also published numerous books, researches and scientific papers and received several awards and recognitions for Journal of Materials Engineering and Performance and has further delivered numerous trainings, courses, seminars, workshops and conferences internationally.

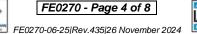
















Training Methodology

All our Courses are including Hands-on Practical Sessions using equipment, Stateof-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

Day I	
0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introduction
0815 - 0830	PRE-TEST
	Electrochemical Basis of Corrosion & Cathodic Protection
0830 - 0930	Electrochemistry • Electrochemical & Galvanic Series • Thermodynamics •
	Kinetics • Immunity & Passivity
0930 - 0945	Break
	Introduction to Corrosion Forms
0945 - 1130	Nature of Corrosion • Forms of Corrosion • Effects of Soil Conditions • Effects
	of System Operation • Microbiological Corrosion • Electrolytic Corrosion
	Cathodic Protection Fundamentals
1130 - 1230	Mechanism of Cathodic Protection • Energy Diagrams • Equivalent Circuits •
	Types of Cathodic Protection Systems • Synergy with Coatings
1230 - 1245	Break
1245 - 1300	Cathodic Protection Measurements
	Reference Electrodes • Voltmeters • Field measurements
1300 - 1420	Cathodic Protection Design Fundamentals
	Design Objectives • Required Information • Environment • Field Surveys •
	Current Requirement • Current Densities • Coatings • Sacrificial Anodes
	Design • Impressed Current Design
1420 - 1430	Recap
1430	Lunch & End of Day One

Dav 2

0730 - 0830	Associated Aspects of Corrosion Control Materials Selection • Metals • Non Metals • Metal Alloys • Stainless Steels • Standards • Environment • Design Do's Don'ts • Cathodic Protection •
	Protective Coatings
0830 - 0930	Corrosion Control Using Coatings
	Organic Coatings • Active (Galvanic) Coatings • Inhibitive Coatings •
	<i>Application of Coatings</i> • <i>Failure Mechanism of Coatings</i> • <i>Test Methodologies</i>





















0930 - 0945	Break
0945 – 1230	Sacrificial CP Design - Offshore Structures & Pipelines Platform Anodes • Design • Types of Anodes • Fabrication of Anodes • Effect of Temperature • Anodes Resistance • Connections • Crossings• Landfalls • Anodes Retrofittings • Anodes Sleds
1230 - 1245	Break
1245 – 1315	Offshore Sacrificial Cathodic Protection Systems - Statistics Offshore CP Operational Integrity • CP Anodes Retrofitting Forecast & Replacement Plan • Case History Arabian Gulf
1315 – 1420	Cathodic Protection Design - Land Pipelines Sacrificial Anodes • Types of Anodes • Impressed Currents Anodes • Type of Anodes • Ground Bed Designs • Design Steps • Example Calculations • Road Crossings • Casings
1420 - 1430	Recap
1430	Lunch & End of Day Two

Day 3	
0730 – 0845	Cathodic Protection Design - Production & Injection Well Casing
	Well Completion & Construction • CP Current & CP Design • Ground Bed
	Designs • CP Deep Well • Transformer Rectifiers • Alternative Power
	Supplies • CP Monitoring
	Impressed Current Cathodic Protection Design - Onshore Pipelines
0845 - 0930	Corrosion Cells • Design • Preliminary Steps & Site Survey • Current
	Densities• Basic Calculations • Road Crossings • Isolation Joints
0930 - 0945	Break
	Impressed Current Cathodic Protection Design - Plants
0945 - 1100	Effects of Geometry • Earthing, Concrete Foundations • Drains & Slab-on-
0945 - 1100	Grade • Anode Layouts • Remote • Close • Combination • Monitoring Using
	Coupons • Voltage Gradient • Pulse Techniques
	Best Practices in Pipelines Cathodic Protection Design, Monitoring,
1100 - 1230	Assessment & Maintenance
1100 - 1230	Best Practices during CP Design • CP Monitoring • CP Assessments • CP
	Maintenance • New Initiatives • Lessons Learnt
1230 - 1245	Break
1245 – 1420	Corrosion Management on Pipelines with Cathodic Protection
	Pipeline Risks & Corrosion • Galvanic Sacrificial Anodes • Impressed Current
	System • Case Study SA • Case Study ICCP
1420 - 1430	Recap
1430	Lunch & End of Day Three

Dav 4

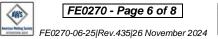
Day T	
0730 - 0820	Cathodic Protection System Design for Tanks New Systems • Retrofit Systems • Grid Systems • Secondary Containment • Double Bottom Tanks • Monitoring Issues
0820 - 0930	Cathodic Protection System Design for Tanks - Case History Background • Investigation Methodology • Diagnostic & Troubleshooting • Findings • Proposed Strategies
0930 - 0945	Break
0930 - 1015	Cathodic Protection Systems Interactions Areas of Interferences • CP Interference • HVAC Interference • DC Interference • AC interference • Mitigation Methods















1015 - 1230	Stray Current Interaction with Other Structures
	Anodic Areas • Service Corridors • Pipeline Interactions • Stray Currents •
	Current Drainages • Electrical Fields • Traction Systems
1230 - 1245	Break
1245 - 1320	Reinforced Concrete - Corrosion & Corrosion Control
	Rebar Corrosion • Types of Concrete Damage • Breakdown of Passive Film •
	Detection of Corrosion • Rust & Chloride Migration • Pourbaix • Current
	Densities • Cathodic Protection • Type of Anodes
1320 - 1420	Underwater CP Inspection Methods
	Why CP Inspection • Stds & Regulations • Offshore Structures Life • CP
	Measurements • CP Surveys • ROV • Trailing Wire • Calibrations •
	Reporting • Data Analysis
1420 - 1430	Recap
1430	Lunch & End of Day Four

Day 5

Monitoring of Cathodic Protection Systems
Test Point Monitoring • On/Off Potential • Soil Gradient • CP Coupons •
Current Surveys • Close Interval Surveys • Offshore CP Monitoring • ROV
Specialised CP Survey Techniques
CIPS • Pearson • DCVG • AC Attenuation • Combined Surveys • Evaluation
of Data • CPCM Case History
Break
Cathodic Protection Construction
Sacrificial Anodes • Deep Wells • Cables & Connections • Circuit Resistance
& Soil Resistivity • Backfills • Example Calculations • CP Materials • HSE
CP Troubleshooting Techniques
Measurements • Galvanic Anodes Troubleshooting • Potential Instant Off •
Impressed Current Systems Troubleshooting
Break
Cathodic Protection Rectifiers
Basic Electrical Circuit • Output Regulation • Control Modes • Surge
Protection • Fault finding
Summary / Open Forum
Course Conclusion
POST-TEST
Presentation of Course Certificates
Lunch & End of Course

















Equipment (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "RE-5C Electrode".



Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org











