

COURSE OVERVIEW EE0043
Basic Electrical Inspection

Course Title

Basic Electrical Inspection

Course Date/Venue

December 15-19, 2024/ Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference

EE0043

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.

The deterioration of electrical equipment is normal, and this process begins as soon as the equipment is installed. If deterioration is not checked, it can cause electrical failures and malfunctions



In addition, load changes or circuit alterations may be made without overall design coordination, which can result in improper selection of equipment, or settings of protective devices, or wrong trip devices installed in the circuits.

A well-organized and implemented electrical inspection and testing program minimizes accidents, reduces unplanned shutdowns, and lengthens the mean time between failures (MTBF) of electrical equipment.



This course is designed to provide delegates with proper techniques for the inspection and testing of various electrical equipment and systems. It covers the inspection and testing of cables, transformers, switchgears, circuit breakers, motors and generators. Further, the course discusses the importance of electrical safety including practices and precautions and the electrical power system grounding.

Course Objectives

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

- Apply and gain an in-depth knowledge on electrical inspection and testing
- Discuss direct-current/voltage testing of electrical equipment as well as carryout proper AC voltage testing methods
- Identify cables types and applications and explain cable failures and analysis as well as apply systematic cable inspection/testing techniques including cable fault locating methods
- Define switchgear and perform switchgear maintenance and electrical switchgear testing
- Review motor types and applications and carryout motor testing and inspection including generator operation, testing and maintenance
- Analyze electrical power system grounding and employ electrical safety practices and procedures
- Illustrate the effect of electrical shock and carryout first aid

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 electrical inspection and testing for electrical engineers, electrical supervisors and electrical technicians engaged in the inspection and testing of electrical equipment.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-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.

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 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: -


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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.

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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.

Accommodation

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

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. Ahmed Abozeid is a **Senior Electrical Engineer** with over **25 years of Onshore & Offshore** experience within the **Oil & Gas, Refinery, Petrochemical** and **Power** industries. His wide expertise covers **HV Cable Design, Cable Splicing & Termination, Cable Jointing Techniques, High Voltage Electrical Safety, HV/MV Cable Splicing, High Voltage Circuit Breaker Inspection & Repair, High Voltage Power System Safe Operation, High Voltage Safety, High Voltage Transformers, Safe Operation of High Voltage & Low Voltage Power Systems, Electric Distribution System Equipment, Practical Troubleshooting of Electrical Equipment & Control Circuits, Electrical & Control System Testing & Commissioning, LV/MV/HV Circuit Breakers Inspection & Maintenance, Electrical Power Substation Maintenance, Practical High Voltage Safety Operating Procedures, Modern Power System Protective Relaying, Electrical & Control System Testing, Design, Commissioning, Operation and Maintenance of Switchgears, Transformers, Substations, Medium & High Voltage Equipment and Circuit Breakers, Electrical Motors & Variable Speed Drives, Motor Speed Control, Power Electronic Converters, AC Converters Section, Electromagnetic Compatibility (EMC), Motor Failure Analysis & Testing, Machinery Fault Diagnosis, Bearing Failure Analysis Process Control & Instrumentation, Process Control Measurements, Control System Commissioning & Start-Up, Control System & Monitoring, Power Station Control System, Instrumentation Devices, Process Control & Automation, PID Controller, Distributed Control Systems (DCS), Programmable Logic Controllers (PLC), ABB PLC & DCS System, Gas Analyzers, Simulation Testing, Load Flow, Electrical Load Forecasting, Short Circuit, Smart Grid, Vibration Sensors, Cable Installation & Commissioning, Calibration Commissioning and Site Filter Controller.** Further, he is also well-versed in **Fundamentals of Electricity, Electrical Standards, Electrical Power, PLC, Electrical Wiring, Machines, Transformers, Motors, Power Stations, Electro-Mechanical Systems, Automation & Control Systems, Voltage Distribution, Power Distribution, Filters, Automation System, Electrical Variable Speed Drives, Power Systems, Power Generation, Power Transformers, Diesel Generators, Power Stations, Uninterruptible Power Systems (UPS), Battery Chargers and AC & DC Transmission.** He is currently the **Project Manager** wherein he manages, plans and implements projects across different lines of business.

Mr. Ahmed worked as the **Electrical Manager, Assistant General Technical Manager, Electronics & Instruments Head, Electrical Power & Machine Expert, Electrical Process Leader, Team Leader, Electrical Team Leader, Electronics & Instruments Maintenance Superintendent, Engineering Supervisor, Technical Instructor** and **Instructor/Trainer** from various companies such as the Lafarge Nigeria, Egyptian Cement Company, ECC Training Center, Alrajhi Construction & Building Company and Ameria Cement Company, just to name a few.

Mr. Ahmed has a **Bachelor** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, seminars, courses, workshops and conferences internationally.



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: Sunday 15th of December 2024

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction Why Maintain & Test • Electrical Preventive Maintenance • Overview of Electrical Maintenance & Testing Strategies • Run-To-failure (RTF) • Inspect & Service as Necessary • Time-based Maintenance (TBM) • Time-based Maintenance (TBM) • The Most Common Predictive Tests • Planning an EPM Program • Maintenance Management Considerations • Responsibilities • Inspection • Scheduling • Work Orders • Record Keeping • Testing & Test Methods • Acceptance Tests • Routine Maintenance Tests • As-left Tests • Special Maintenance Tests
0930 – 0945	Break
0945 – 1100	Direct-Current/Voltage Testing of Electrical Equipment Capacitance Charging Current • Dielectric Absorption Current • Surface Leakage • Volumetric Leakage Current • Advantages of DC Voltage Testing • Disadvantages of DC Voltage Testing • DC Testing Methods • Evaluation of Test Data Readings • What Factors should be Considered to Determine Whether Insulation is Good or bad? • What Physical Factors may Influence the Readings? • Acceptance Criteria for Rating Insulation
1100 – 1230	AC Voltage Testing Methods PF & DF Test Methods • Principles of PF/DF Testing • Description of the PF Test Equipment • General Instructions for the Operation of the Megger Test Set • Transformer Types • Transformer Applications • Transformer Maintenance • Transformer Oil Testing • Transformer Diagnostic Guide
1230 – 1245	Break
1245 - 1430	Cables Types & Applications Low Voltage Cables • Cable Catalogue • Cable Sizing • T.D.F • Burial Depth Derating Factor • Soil Thermal Resistivity Derating Factor • Adjacent Cables • Voltage Drop Check • Power Cables • Laminated Type • Extruded Type • Finishes & Jackets • Cable Construction
1430	Lunch & End of Day One

Day 2: Monday 16th of December 2024

0730 – 0900	Cable Failures & Analysis Corrosion of Sheath • Moisture in the Insulation • Heating of Cables • Fire & Lightning Surges
0900 – 0915	Break
0915 – 1100	Cable Inspections/Testing Techniques Testing & Acceptance of Cables • AC Hi-Pot Testing • Cable Test Connection for Insulation Resistance Measurement • PF & DF Testing • PD Test • AC Resonance Test • Advantages of DC Hi-pot Test • Disadvantages of DC Hi-pot Test • Advantages Of 50/60 Hz Hi-pot & Ac Resonant Test • Disadvantages Of 50/60 Hz Hi-pot & Ac Resonant Test • Advantages of PD diagnostics • Disadvantages of PD diagnostics





1100 – 1230	Cable Fault Locating Methods Bridge Methods • Radar Method • Impulse (Thumper) Method • Electromagnetic Impulse Detection Technique
1230 – 1245	Break
1245 – 1430	Switchgear Low Voltage C.B Characteristics • L.V.C.B. Characteristics • Low Voltage C.B. Types • High Voltage C.B • Arc Interruption • Minimum Oil Circuit Breakers • SF6 Circuit Breaker • Vacuum Circuit Breaker • Protective Relays • Relay Application & Principles • Overcurrent Relays • Directional Relays • Distance Relaying • Differential Relaying • Pilot Wire Relaying
1430	Lunch & End of Day Two

Day 3: Tuesday 17th of December 2024

0730 – 0930	Switchgear Maintenance Electrical Switchgear Maintenance • Installation • Maintenance • Oil Circuit Breaker • Vacuum Circuit Breaker
0930 - 0945	Break

0945 – 1100	Electrical Switchgear Testing Insulation Resistance Measurement Test • DC Hi-Pot Test • AC Hi-Pot Test • Circuit Breaker Contact Resistance Measurement Test • Circuit Breaker Time - Travel Analysis • Testing of Protective Relay • Digital Relays • Test List for a Line Protection • Commissioning Methods
1100 – 1215	Motors Types & Applications According to Application • Induction Motors • Introduction • Construction • Rotating Magnetic Field • Synchronous Speed • Motor Design • DC Motors
1215 – 1230	Break
1230 - 1430	Motor Testing & Inspection Dirt & Corrosion • Lubrication • Heat, Noise & Vibration • Brushes & Commutators (DC Motors) • Windings & Insulation • Testing Windings • Cleaning & Drying Windings • Voltage Checks • Effects of Voltage Unbalance • Basic voltage tests to identify applied voltage (motor is not running) • Voltage tests to verify "Line to ground" potentials & to isolate a blown fuse • Continuity Test to Confirm Blown Fuse • Megger Testing an Installed Motor • Partial Discharge Test
1430	Lunch & End of Day Three

Day 4: Wednesday 18th of December 2024

0730 – 0930	Generators Rotor • Stator • DC Generators
0930 - 0945	Break
0945 – 1100	Generator Operation, Testing & Maintenance Why Generators Fail • Foreign Object Damage • Stator Winding Vibration • Rotor Winding Distortion • Overheating • Contamination • Forging Cracks • Water-Cooled Coil Leaks • Stator Wedge Looseness • Rotor Vibration • Stator Core Damage • Generator Inspection • Generator Testing • Stator Insulation Tests • Direct Current Tests for Stator & Rotor Windings • Alternating Current Tests for Stator Windings • Rotor Windings • Generator Testing • Low-Core Flux Test (EL-CID)





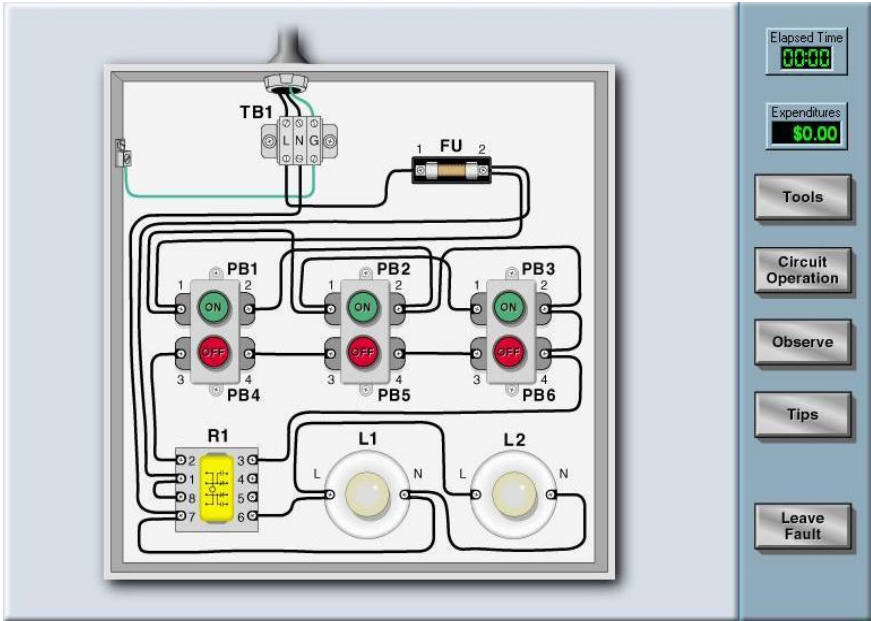
1100 – 1215	Generator Maintenance Stator Frame • Rotor • Stator Winding • Coolers • Bearings Brushgear
1215 – 1230	Break
1230 - 1430	Electrical Power System Grounding Standard In Describing Power System Grounding • Selection of Grounding Method • Solidly Grounded Systems • Grounding Ungrounded Systems • Grounding Electrode Resistance • Grounding Electrode • Ground Resistance Calculation • Why Test Grounding Systems? • What is a good ground value? • Components of a Ground Electrode • Spheres of Influence
1430	Lunch & End of Day Four

Day 5: Thursday 19th of December 2024

0730 – 0930	Electrical Power System Grounding (cont'd) What affects ground resistance? • Types of Ground Systems • Methods of Testing • Soil Resistivity • Soil Resistivity – Testing • Soil Resistivity – Calculation • Fall of Potential Testing • Fall of Potential Testing (II) • Selective Testing • Selective Testing (II) • Stakeless Testing • Stakeless Testing – Details • Two Pole Ground Resistance • Selecting a Test Method
0930 - 0945	Break
0945 – 1100	Electrical Safety Practices & Precautions Electrical Safety Practices & Precautions • Electrical Safety • “On-Site” Electrical Safety • Tagging
1100 – 1215	Effect of Electrical Shock Human Resistance
1215 – 1230	Break
1230 - 1400	First Aid Shock • Resuscitation
1400 - 1415	POST-TEST
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (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 our state-of-the-art “Haward Troubleshooting” simulator.



Elapsed Time
00:00

Expenditures
\$0.00

Tools

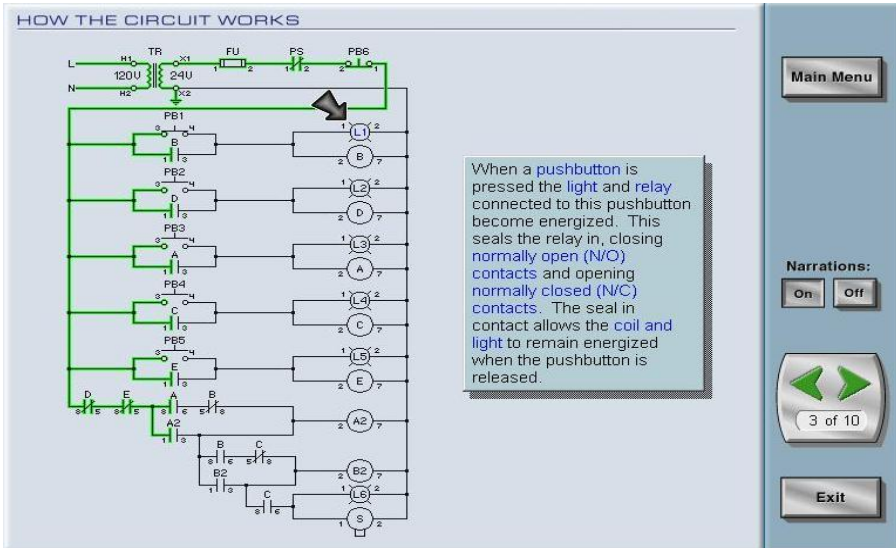
Circuit Operation

Observe

Tips

Leave Fault

Basic Techniques



Main Menu

Narrations:
On Off

3 of 10

Exit

Basic Control Circuits



Motor Control Techniques

Course Coordinator

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