

COURSE OVERVIEW EE0460
Electrical Equipment Protection, Safety Testing & Inspection

Course Title

Electrical Equipment Protection, Safety Testing & Inspection

Course Date/ Venue

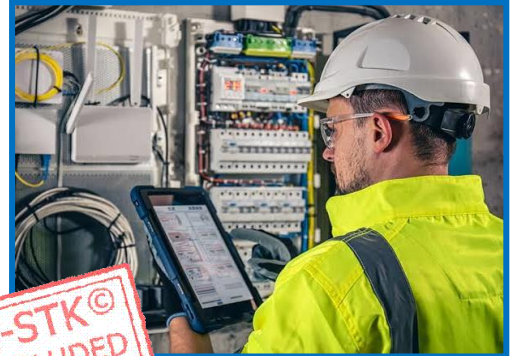
September 20-24, 2026/TBA Meeting Room, Al Bandar Rotana - Creek, Dubai, UAE

Course Reference

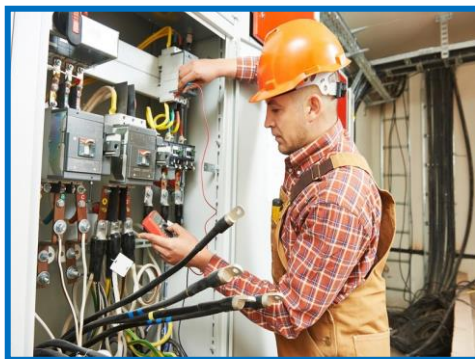
EE0460

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Description



This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.



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 units installed in the circuits. The purpose of an electrical preventive maintenance and inspection program (EPM) should be to recognize these factors and provide means for correcting them.



With an electrical preventive maintenance and inspection program, potential hazards that can cause failure of equipment or interruption of electrical service can be discovered and corrected. Also, the EPM program will minimize the hazards to life and equipment that can result from failure of equipment when it is not properly maintained.

Properly maintained equipment reduces downtime by minimizing catastrophic failures. To carry out the successful operation of electrical equipment and apparatus, it is essential to set up an effective maintenance and inspection program.

The course shall consist of conducting routine inspections, tests, repairs, and service of electrical power system apparatus such as transformers, cables, circuit breakers, switchgear assemblies, and the like, along with associated equipment comprised of control wiring, protective devices and relays, supervisory equipment, and indicating and metering instruments.

To obtain maximum life from electrical equipment, maintain its reliability, and minimize repair costs, it is necessary inspect it periodically to predict its condition. Further, in order to be in compliance with NEC, OSHA, and DOE regulations all electronic and electrical equipment will have to be inspected in regular basis.

This course is designed to provide a wealth of ideas and recommendations to guide modern power systems operators in getting the very most from both aging and new equipment. At both the introductory and advanced levels, the course outlines the analytical and material theory behind equipment inspection and maintenance, reinforcing that with practical insight and recommendations based on sound engineering principles. The course covers all types of apparatus and equipment found in the electrical power systems serving industrial and commercial facilities, large institutional complexes and office buildings, and utility type substations and generating plants.

This course provides practical information on the maintenance and inspection of electrical equipment for the maintenance personnel who install and care for such equipment. The scope is both very broad and specialized. Therefore, to carry out the inspection procedures and maintenance practices discussed in this course one must either have or acquire the necessary knowledge to carry them out successfully and safely. This course is suitable for people whose professional duties require them to carry out the inspection and testing of electrical equipment and must be competent to carry out this task.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on electrical equipment inspection
- Discuss the magnetic and electric fields, electromagnetic induction, electrical current, alternating current circuits, instantaneous power, complex power, etc.
- Identify standard voltages of electricity supply, variations of voltage and frequency, systems of supply, industrial distribution systems and low voltage distribution circuits
- Recognize the problems relating to Ohm's law and apply visual inspection, continuity tests, polarity test, insulation tests, phase sequence test and earthing tests
- Discuss switchgear, circuit breakers and transformer
- Carryout oil testing, oil sampling procedure, oil purification and dehydration, yearly insulating oil testing, oil aging and preventive maintenance procedures
- Employ systematic inspection and testing of transformer, AC motors, generators, and earthing
- Install and test safety equipment in a professional manner
- Implement safety working practices and general guidelines as well as installation guidelines, lifting techniques and 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 equipment inspection for electrical engineers, managers, technicians and those who are involved with the planning, implementation, and/or supervision of electrical preventive maintenance (EPM) programs for electric power equipment in industrial plants, utilities, and commercial facilities.

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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.

Accommodation

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

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

Haward's certificates are accredited by the following international accreditation organizations: -

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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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

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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.

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. Pan Marave, PE, MSc, BEng, is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience in **Oil, Gas, Petrochemical, Refinery & Power** industries. His expertise includes **Electrical Safety, Power System Equipment, Electrical Drawing, Transmission Networks, Substation, Cable & Over Head Line, Substation Automation Systems & Application, Distribution Networks, Circuit Breaker, HV Switchgear Maintenance, HV/LV Electrical Authorisation, Electrical Equipment Inspection, Testing &**

Troubleshooting, Basic Electricity, Electrical & Special Hazards, Personnel Protection, HV/LV Equipment, Motor Controllers, Electrical Switching Practices, Uninterruptible Power Supply (UPS), UPS and Battery System, Preventive Maintenance of Battery Charger and UPS System, UPS, DC System & Battery Design, Operation, Maintenance & Troubleshooting, Emergency Planning, Safety Management, Safety Instrumented Systems (SIS), Safety Integrity Level (SIL), Emergency Shutdown (ESD); Electrical Installation, Maintenance & Troubleshooting, Electrical Inspection & Testing, Electrical Measurements, Power Flow Analysis of Electrical Power Systems, Electrical Fundamentals, Basic Electricity & Electrical Codes, DCS, SCADA & PLC; Measurement (Flow, Temperature, Pressure); Process Analyzers & Analytical Instrumentation; Process Control, Instrumentation & Safeguarding; Process Controller, Control Loop & Valve Tuning; Industrial Distribution Systems; Industrial Control & Control Systems, Power Systems Protection & Relaying; Earthing, Bonding, Grounding, Lightning & Surge Protection; Electric Power Substation & Systems; Electrical Engineering Principles; Motor Control Circuit; Electrical Fault Analysis; Electrical Networks & Distribution Cables; Circuit Breakers, Switchgears, Transformers, Hazardous Areas Classification and Detailed Engineering Drawings, Codes & Standards. Furthermore, he is also well-versed in Microprocessors Structure, Lead Auditor (ISO 9000:2000), ISO 9002, Quality Assurance, and Projects & Contracts Management.

Presently, Mr. Marave is the **Technical Advisor** of **Chamber of Industry & Commerce** in Greece. Prior to this, he gained his thorough practical experience through several positions as the **Technical Instructor, Engineering Manager, Electronics & Instruments Head, Electrical, Electronics & Instruments Maintenance Superintendent, Assistant General Technical Manager** and **Engineering Supervisor** of various international companies such as the **Alumil Mylonas, Athens Papermill, Astropol** and the **Science Technical Education**.

Mr. Marave is a **Registered Professional Engineer** and has **Master** and **Bachelor** degrees in **Electrical Engineering** from the **Polytechnic Institute of New York** and **Pratt Institute of New York (USA)** respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)** and an active member of the **Technical Chamber** and the **Institute of Electrical and Electronics Engineer (IEEE)** in Greece. He has presented and delivered **numerous international** courses, conferences, trainings and workshops worldwide.

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, 20th of September 2026

0730 – 0800	Registration & Coffee
0800 – 0815	Welcome & Introduction
0815 – 0830	PRE-TEST
0830 – 0930	Introduction & Basics Magnetic Field • Magnetic & Electric Fields • Electromagnetism • Electromagnetic Induction • Generating Electrical Current • Alternating Current Circuits • Instantaneous Power (P) • Complex Power • Power Triangle • Power Factor • Three Phase System • Worldwide AC Voltages & Frequencies • Per-Unit Values • Do it Yourself
0930 – 0945	Break
0945 – 1100	Electricity Supply Standard Voltages • Variations of Voltage & Frequency • Systems of Supply • Industrial Distribution Systems • Low Voltage Distribution Circuits
1100 – 1215	Problems Relating to Ohm's Law Practical Problems Involving Ohm's Law • Problems Relating to Installation Faults in Series •
1215 – 1230	Break
1230 – 1420	Problems Relating to Ohm's Law (cont'd) Resistances in Series Formation • Installation Problems Involving Ohm's Law
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2: Monday, 21st of September 2026

0730 – 0930	Inspection & Testing Needs for Inspection & Testing • Identification & Notices • Visual Inspection • Continuity Tests • Polarity Test • Insulation Tests • Phase Sequence Test • Earthing Tests • After Testing
0930 – 0945	Break
0945 – 1100	Introduction to Switchgear Difference Between a Fuse & a Circuit Breaker • Comparison Between Switch, Isolator & Circuit Breaker • Components of a Switch Gear • Bus-Bar Arrangements • Ratings of Busbars • Switchgear Accommodation • Clearance of Busbars • Short-Circuit • Short-Circuit Currents • Faults in a Power System • Do it Yourself
1100 – 1215	Circuit Breaker Arc Phenomenon • Principles of Arc Extinction • Methods of Arc Extinction • Important Terms • Classification of Circuit Breakers • Sulphur Hexafluoride (SFG) Circuit Breakers • Vacuum Circuit Breakers (VCB) • Circuit Breaker Operating Mechanisms • Circuit Breaker Components • Circuit Breaker Ratings • Application Range of Circuit Breakers

1215 – 1230	Break
1230 – 1420	Circuit Breaker (cont'd) Mechanical Tests • Thermal Tests • Dielectric Tests (High Voltage Tests) • Short-Circuit Tests • Insulation Resistance Measurement at Site • Contact Resistance Test • Operation Test • Maintenance of Circuit Breaker • Maintenance Schedule for Circuit-Breakers • Maintenance of Vacuum Circuit-Breaker • Maintenance of Sf6 Circuit-Breaker • Do it Yourself
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3: Tuesday, 22nd of September 2026

0730 – 0930	Transformer Theory Magnetic Circuit • Magnetic & Electric Circuits of a Transformer • Winding, Current & Voltage Ratios • Laws of Transformer • Principle of Operation of a Transformer • Transformer Losses • Efficiency • Regulation • Transformer's Voltage per Turns • Significance of Volts per Hertz • Power Transformer Construction • Transformer Cooling Systems • Do it Yourself
0930 – 0945	Break
0945 – 1100	Oil Testing Definitions • Functions of Transformer Oil • Transformer Oil Properties • Transformer Oil Standards • Hydrocarbon Compounds in Transformer Oil • Moisture Problems • Factors Affecting Transformer Oil Properties
1100 – 1215	Oil Testing (cont'd) Cellulose Degradation • Global View • Oil Dielectric Strength Test • Relative Water Content Test • Physical & Chemical Tests (Polar Characteristics of Oil) • Dielectric Losses Angle & Resistivity Test (Power Factor Test) • Transformer Dissolved Gas-in-Oil Analysis (DGA)
1215 – 1230	Break
1230 – 1420	Oil Testing (cont'd) Oil Color Test • Insulating Oil Sampling Procedure • Oil Purification & Dehydration • Yearly Insulating Oil Testing • Oil Aging • Preventive Maintenance Procedures for Transformer Oil • Do it Yourself
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4: Wednesday, 23rd of September 2026

0730 – 0930	Transformer Inspection & Testing Test Data • Abnormal Operating Conditions of Power Transformer • Reasons for Transformer Testing • Transformer Performance Assurance • Classification of Transformer Tests • Winding Resistance Test • Polarity Test • Ratiometer Test • No-Load Losses Test • Load Losses Test • Percent Impedance Voltage Measurement • Leakage Reactance Measurement • Efficiency Test
0930 – 0945	Break
0945 – 1100	Transformer Inspection & Testing (cont'd) Winding Insulation Resistance Test • Winding Insulation Capacitance & Dissipation Factor (Tan δ) Test • Sudden Short Circuit Withstand Test • Oil Pressure Test • Temperature Rise Test • Impluse Testing • Transformer Arrival: Handling, Inspection & Pre-Commissioning • Do it Yourself

1100 – 1215	AC Motors & Generators Inspection & Testing NEMA Classification of Motors & Generators • AC Generators Maintenance & Testing • Three Phase Squirrel Cage Motors Inspection & Testing • Motor & Generator Insulation Systems • Other Insulation Test Methods
1215 – 1230	Break
1230 – 1420	Earthing Installation & Testing Earthing Principles • Protective Earthing Equipments • Soil Resistivity • Earth • Grounding Electrodes • Earthing Conductors • Equipment Grounding • System Grounding • Bonding • Practical Considerations • Methods for Decreasing Earthing Resistance • Ground Inspection Wells • Software • Ground Resistance Measurements • Protective Grounding of Power Lines
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5: Thursday, 24th of September 2026

0730 – 0930	Installation & Testing Safety Equipments General Inspection & Testing Requirements for Electrical Safety Equipment • Flash & Thermal Protection • Head & Eye Protection • Rubber-Insulating Equipment • Hot Sticks • Insulated Tools • Barriers & Signs • Safety Tags, Locks, & Locking Devices • Voltage-Measuring Instruments • Safety Grounding Equipment • Ground Fault Circuit Interrupters • Safety Electrical One-Line Diagram • The Electrician's Safety Kit
0930 – 0945	Break
0945 – 1100	Safety Working Practices & General Guidelines Common Causes of Accidents • General Do's & Don'ts: Your Responsibilities • Installation Guidelines • Fire Hazards • Lifting Techniques • First Aid
1100 – 1215	Troubleshooting Methods & Procedures Basic Principles in Using a Drawing and Meter in Troubleshooting Circuits • Checks for Circuit Continuity with Disconnected Supply • Checks for Circuit Continuity with Live Supply • Tests and Methods • Testing Devices • Circuits • Accurate Wiring of Circuits and Connections • Tests for Installation and Troubleshooting
1215 – 1230	Break
1230 – 1345	Troubleshooting Instruments & Tools D'Arsonval Meter Movement • Voltmeter • Series Ohmmeter • Electrodynamometer • Megger • Clamp-On Ammeters • Infrared or Thermal Scanners • Phase Sequence Indicator • Rotation Tester • Proximity Voltage Meters • Hand-held Oscilloscopes
1345 – 1400	Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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