COURSE OVERVIEW EE0689-10D
Circuit Breaker & Switchgear, Inspection, Maintenance, Design, Repair & Troubleshooting

Course Title
Circuit Breaker & Switchgear, Inspection, Maintenance, Design, Repair & Troubleshooting

Course Date/Venue
November 22-December 03, 2026/TBA
Meeting Room, Four Seasons Hotel Cairo at Nile Plaza, Corniche El Nil, Garden City, Cairo, Egypt

Course Reference
EE0689-10D

Course Duration/Credits
Ten days/6.0 CEUs/60 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.

This course is designed to provide participants with a detailed and up-to-date overview of Circuit Breaker & Switchgear Inspection, Maintenance, Design, Repair and Troubleshooting. It covers the basic electrical concepts and principles of circuit breakers and switchgear; the power distribution systems, arc phenomena and circuit interruption; the safety practices and standards in circuit breaker maintenance; the circuit breakers classification and the difference between low voltage and high voltage circuit breakers; and the air circuit breakers (ACB), vacuum circuit breakers (VCB), sf6 circuit breakers and oil circuit breakers.

Further, the course will also discuss the various types, applications, components, functions and design considerations of switchgear; the circuit breaker ratings, specifications, selection criteria, system requirements and characteristics; the circuit breakers preventive and predictive maintenance techniques, maintenance scheduling and planning, inspection procedures and checklists; and the lubrication and cleaning of circuit breakers including record-keeping and documentation of maintenance activities.

During this interactive course, participants will learn the importance of circuit breaker testing in maintenance and the types of tests, testing equipment and tools; the procedures for performing electrical tests and interpreting test results; the common problems and faults in circuit breakers; the diagnostic techniques for troubleshooting and step-by-step troubleshooting procedures; the circuit breaker curves and coordination with other protective devices; the digital and intelligent circuit breakers, remote monitoring and control of breakers; the advanced protection and control systems and integration of circuit breakers with smart grids; the emerging technologies in circuit breaker design; and the future trends in circuit breaker and switchgear industry.

Course Objectives

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

- Apply and gain an in-depth knowledge on circuit breaker and switchgear inspection, maintenance, design, repair and troubleshooting
- Discuss the basic electrical concepts and principles of circuit breakers and switchgear
- Recognize power distribution systems, arc phenomena and circuit interruption as well as safety practices and standards in circuit breaker maintenance
- Classify circuit breakers, differentiate low voltage versus high voltage circuit breakers and discuss air circuit breakers (ACB), vacuum circuit breakers (VCB), sf6 circuit breakers and oil circuit breakers
- Identify the various types, applications, components, functions and design considerations of switchgear
- Recognize circuit breaker ratings, specifications, selection criteria, system requirements and characteristics
- Employ circuit breakers preventive and predictive maintenance techniques, maintenance scheduling and planning, inspection procedures and checklists
- Carryout lubrication and cleaning of circuit breakers including record-keeping and documentation of maintenance activities
- Discuss the importance of circuit breaker testing in maintenance and identify the types of tests, testing equipment and tools
- Implement proper procedures for performing electrical tests and interpret test results
- Identify the common problems and faults in circuit breakers and apply diagnostic techniques for troubleshooting and step-by-step troubleshooting procedures
- Recognize circuit breaker curves, read and interpret curves and coordination with other protective devices
- Describe digital and intelligent circuit breakers as well as apply remote monitoring and control of breakers, advanced protection and control systems and integration of circuit breakers with smart grids
- Discuss the emerging technologies in circuit breaker design and the future trends in circuit breaker and switchgear industry

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 circuit breaker and switchgear for engineers and other technical staff who need a sound understanding of Low, Medium and High Voltage Switchgear and Circuit Breaker specification, design, operation, inspection, testing, maintenance, repair and troubleshooting.

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: -

- 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.

- 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 **6.0 CEUs** (Continuing Education Units) or **60 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. Ahmed Alaa, MSc, BSc, API-SIEE is a **Senior Electrical & Instrumentation Engineer** with extensive years of experience within the **Oil**, **Gas**, **Petrochemical**, **Refinery** & **Power** industries. His expertise widely covers in the areas of API Source Inspector Electrical Equipment, Electrical Equipment Inspection, **HV/MV Cable Splicing**, **Cable & Over Head Power Line**, **HV/MV Switchgear, HV Cable** Design, **Cable** Splicing & Termination, **High Voltage Electrical Safety**, **Medium & High Voltage Equipment**, **High Voltage Circuit Breaker** Inspection & Repair, **High Voltage Power** System, **HV Equipment** Inspection & Maintenance, **HV Switchgear** Operation & Maintenance, Resin / **Heat Shrink & Cold Shrink** Joints, **HV/LV Equipment**, **LV & HV Electrical System**, **LV**, **MV & HV Cable** Installations & Properties, ORHVS for Responsible and Authorized Person **High Voltage Regulation**, **Transformers** Maintenance, inspections & repairs, Commissioning of **LV & HV Equipment**, Electrical Transient Analysis Program (ETAP), Programmable Logic Control (**PLC**), PLC for Process Control & Automation, Programmable Logic Controller (**PLC**) Operations, Maintenance and Troubleshooting, Programmable Logic Controllers (**PLC**), **PLC** Basics to Advanced Application, Power Management System (**PMS**), Variable Speed Drive (**VSD**), Advanced **ABB VSD** Controllers, **VSD** commissioning and troubleshooting, Power Management System (PMS), Marine Vessel Power Management Systems, Electrical Equipment & Control System, Ex Equipment, **Power System Operation and Control**, Fault Analysis in **Power Systems**, **LV & MV** Electric Power Systems for Industrial Plants, Electric Power System Operation, **Electric Motors & Variable Speed Drives**, **Electric Motor** Selection, Maintenance & Control, **Motor Operation & Maintenance**, **Electric Motor Protection**, **UPS** and **Battery** System, **UPS & Battery** Design, Operation, Maintenance & Troubleshooting, **UPS, DC System & Battery** Design, Operation, Maintenance & Troubleshooting Testing & Maintenance, Installing and Testing **Electric Wires & Cables**, Cable Jointing Appreciation, **Circuit Breaker & Switchgear**, **Transformer & Circuit Breakers** Testing & Maintenance and **Motor Control Circuit** Troubleshooting.

During Mr. Ahmed's career life, he has gained his practical experience through several significant positions and dedication as the **Senior Electrical Engineer**, **Electromechanical Engineer**, **Electrical Maintenance Engineer**, **Electrical Instructor** and **Instructor/Trainer** from various companies like the Khalda Petroleum Company, Qarun Petroleum Company, Arab Contractor Company and Uniplast Company.

Mr. Ahmed has a **Bachelor's** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer** and a **Certified API Source Inspector Electrical Equipment** (**SIEE**). He has further delivered numerous trainings, courses, workshops, seminars and conferences internationally.

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.

Accommodation

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

Course Fee

US$ 8,800 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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, 22th of November 2026***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Circuit Breakers & Switchgear***
0930 – 0945	*Break*
0945 – 1030	***Basic Electrical Concepts & Principles***
1030 – 1130	***Overview of Power Distribution Systems***
1130 – 1215	***Understanding Arc Phenomena & Circuit Interruption***
1215 – 1230	*Break*
1230 – 1330	***History & Evolution of Circuit Breakers***
1330 – 1420	***Safety Practices & Standards in Circuit Breaker Maintenance***
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2: ***Monday, 23th of November 2026***

0730 – 0830	***Classification of Circuit Breakers***
0830 – 0930	***Low Voltage versus High Voltage Circuit Breakers***
0930 – 0945	*Break*
0945 – 1130	***Air Circuit Breakers (ACB)***
1130 - 1200	***Vacuum Circuit Breakers (VCB)***
1200 - 1230	***SF6 Circuit Breakers***
1230 - 1245	*Break*
1245 - 1420	***Oil Circuit Breakers & Comparison with Modern Breakers***
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3:	Tuesday, 24th of November 2026
0730 – 0830	**Basics of Industrial Switchgear**
0830 – 0915	**Types of Switchgear (Metal-Enclosed, Metal-Clad, Gas-Insulated, etc.)**
0915 – 0930	Break
0930 – 1030	**Applications of Different Switchgear Types**
1030 - 1130	**Switchgear Components & Functions**
1130 - 1230	**Design Considerations for Switchgear**
1230 – 1245	Break
1245 - 1420	**Case Studies of Industrial Switchgear Installations**
1420 – 1430	**Recap**
1430	Lunch & End of Day Three

Day 4:	Wednesday, 25th of November 2026
0730 – 0830	**Circuit Breaker Ratings & Specifications**
0830 – 0930	**Criteria for Selecting Circuit Breakers**
0930 – 0945	Break
0945 – 1100	**Matching Breakers with System Requirements**
1100 - 1200	**Electrical Characteristics of Circuit Breakers**
1200 - 1230	**Mechanical Characteristics of Circuit Breakers**
1230 - 1245	Break
1245- 1420	**Case Studies on Breaker Selection**
1420 – 1430	**Recap**
1430	Lunch & End of Day Four

Day 5:	Thursday, 26th of November 2026
0730 – 0830	**Preventive Maintenance of Circuit Breakers**
0830 – 0930	**Predictive Maintenance Techniques**
0930 – 0945	Break
0945 – 1130	**Maintenance Scheduling & Planning**
1130 - 1230	**Inspection Procedures & Checklists**
1230 - 1245	Break
1245 - 1420	**Lubrication & Cleaning of Circuit Breakers**
1420 – 1430	**Recap**
1430	Lunch & End of Day Five

Day 6:	Sunday, 29th of November 2026
0730 – 0830	**Record-Keeping & Documentation of Maintenance Activities**
0830 – 0930	**Importance of Testing in Maintenance**
0930 – 0945	Break
0945 – 1130	**Types of Tests (Dielectric, Timing, Contact Resistance, etc.)**
1130 - 1230	**Testing Equipment & Tools**
1230 – 1245	Break
1245 - 1420	**Procedures for Performing Electrical Tests**
1420 – 1430	**Recap**
1430	Lunch & End of Day Six

Day 7:	Monday, 30th of November 2026
0730 – 0830	**Interpreting Test Results**
0830 – 0930	**Case Studies on Testing Circuit Breakers**
0930 – 0945	Break
0945 – 1130	**Common Problems & Faults in Circuit Breakers**
1130 - 1230	**Diagnostic Techniques for Troubleshooting**
1230 - 1245	Break
1245 - 1420	**Step-by-Step Troubleshooting Procedures**
1420 – 1430	**Recap**
1430	Lunch & End of Day Seven

Day 8:	Tuesday, 01st of December 2026
0730 – 0830	**Tools & Equipment for Troubleshooting**
0830 – 0930	**Repair versus Replacement Decisions**
0930 – 0945	Break
0945 – 1130	**Case Studies on Troubleshooting Circuit Breakers**
1130 - 1230	**Circuit Breaker Curves**
1230 - 1245	Break
1245 - 1420	**Types of Curves (Time-Current, Short-Circuit, etc.)**
1420 – 1430	**Recap**
1430	Lunch & End of Day Eight

Day 9:	Wednesday, 02nd of December 2026
0730 – 0830	**Reading & Interpreting Curves**
0830 – 0930	**Protection Coordination Principles**
0930 – 0945	Break
0945 – 1130	**Coordination with Other Protective Devices**
1130 - 1230	**Case Studies on Protection Coordination**
1230 - 1245	Break
1245 - 1420	**Digital & Intelligent Circuit Breakers**
1420 – 1430	**Recap**
1430	Lunch & End of Day Nine

Day 10:	Thursday, 03rd of December 2026
0730 – 0830	**Remote Monitoring & Control of Breakers**
0830 – 0930	**Advanced Protection & Control Systems**
0930 – 0945	Break
0945 – 1100	**Integration of Circuit Breakers with Smart Grids**
1100 - 1145	**Emerging Technologies in Circuit Breaker Design**
1145 - 1200	Break
1200 – 1400	**Future Trends in Circuit Breaker & Switchgear Industry**
1400 - 1415	**Course Conclusion**
1415 – 1430	**POST TEST**
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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