

COURSE OVERVIEW EE0050S3

High and Medium Voltage Substation Design, Testing and Maintenance

Course Title

High and Medium Voltage Substation Design, Testing and Maintenance

Course Reference

EE0050S3

Course Duration/Credits

Five days/3.0 CEUs/30 PDHs



Course Date/Venue

Session(s)	Date	Venue
1	April 20-24, 2025	Safir Meeting Room, Divan Istanbul, Turkey
2	August 17-21, 2025	Olivine Meeting Room, Fairmont Nile City, Cairo, Egypt
3	October 19-23, 2025	Meeting Plus 9, City Centre Rotana Doha, Doha, Qatar
4	December 14-18, 2025	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
5	January 18-22, 2026	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

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 electric power substation, whether generating station or transmission and distribution, remains one of the most challenging and exciting fields of electric power engineering. Recent technological developments have had tremendous impact on all aspects of substation design, operation, maintenance, safety, and grounding, testing and troubleshooting. A substation is a high – voltage electric system facility. It is used to switch generators, equipment, and circuits or lines in and out of a system.



This course is designed to provide participants with a detailed and up-to-date overview of high and medium voltage substation design, testing and maintenance. It covers the various types of substations, substation parts and equipment and major components; the overcurrent protection for phase and earth faults and recommended grading intervals; the relay connection, earth fault protection and overcurrent protection for relay connections, residual voltage and sensitive wattmetric protection; and the transformers function and substation earthing systems.

During this interactive course, participants will learn the reasons for substation earthing system and substation earthing calculation; the substation layout and electrical drawings; the main and circuit of the schematic diagram; the racking and routing, installation detail and panel layout; the other electrical documents, standardization of symbols and schematics exercises; and the qualifications of testing organizational and personnel.

Course Objectives

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

- Apply and gain an in-depth knowledge on high and medium voltage substation design, testing and maintenance
- Identify the various types of substations, substation parts and equipment and major components
- Employ overcurrent protection for phase and earth faults and recommended grading intervals
- Carryout relay connection, earth fault protection and overcurrent protection for relay connections, residual voltage and sensitive wattmetric protection
- Recognize transformers function and substation earthing systems
- Discuss the reasons for substation earthing system and calculate substation earthing
- Analyze the substation layout and interpret electrical drawings
- Illustrate the main and circuit of the schematic diagram
- Identify racking and routing, installation detail and panel layout
- Recognize other electrical documents, standardization of symbols and schematics exercises
- Discuss the qualifications of testing organizational and personnel

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 high and medium voltage substation design, testing and maintenance for industrial, utility or plant engineers, maintenance supervisors, consulting engineers, electric utility engineers and other technical staff.

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

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**. 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. 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, 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's** degree in **Electrical Engineering**. Further, he is a **Certified Instructor/Trainer** and has delivered numerous trainings, seminars, courses, workshops 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.

Course Fee

Istanbul	US\$ 6,000 per Delegate + VAT . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Cairo	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.
Doha	US\$ 6,000 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	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.
Dubai	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 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

0730 – 0800	<i>Registration & Coffee</i>
0800 – 0815	<i>Welcome & Introduction</i>
0815 – 0830	PRE-TEST
0830 – 0930	Types of Substations
0930 – 0945	<i>Break</i>
0945 – 1100	Substations Parts & Equipment
1100 – 1230	Major Components
1230 – 1245	<i>Break</i>
1245 – 1330	Overcurrent Protection for Phase & Earth Faults
1330 – 1420	Recommended Grading Intervals
1420 – 1430	Recap
1430	<i>Lunch & End of Day One</i>

Day 2

0730 - 0930	Relay Connections
0930 - 0945	<i>Break</i>
0945 - 1100	Earth Fault Protection
1100 - 1230	Overcurrent Protection (Relay Connections, Residual Voltage, Sensitive Wattmetric Protection)
1230 - 1245	<i>Break</i>
1245 - 1330	Transformers Function
1330 - 1420	Substation Earthing Systems
1420 - 1430	Recap
1430	<i>Lunch & End of Day Two</i>

Day 3

0730 - 0930	Reasons for Substation Earthing System
0930 - 0945	<i>Break</i>
0945 - 1100	Substation Earthing Calculation
1100 - 1230	The Layout of the Substation
1230 - 1245	<i>Break</i>
1245 - 1420	Understanding Electrical Drawings
1420 - 1430	Recap
1430	<i>Lunch & End of Day Three</i>

Day 4

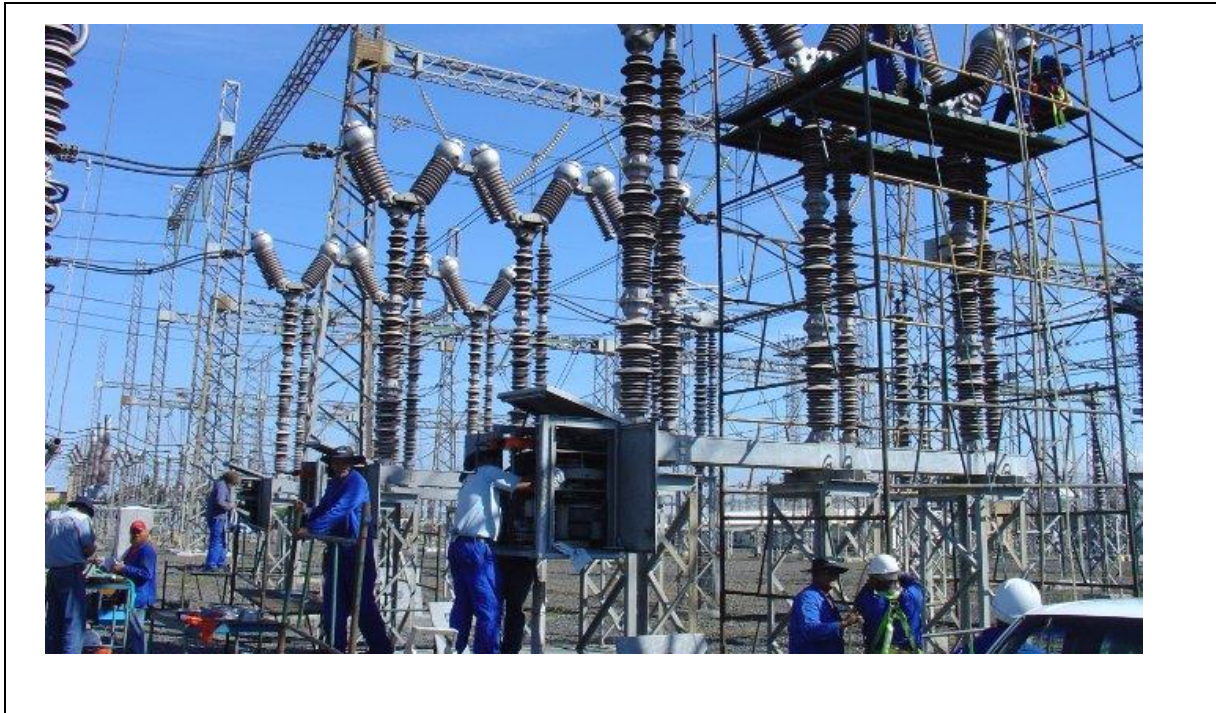
0730 - 0930	The Schematic Diagram (Main & Circuit)
0930 - 0945	<i>Break</i>
0945 - 1100	Racking & Routing
1100 - 1230	Installation Detail
1230 - 1245	<i>Break</i>
1245 - 1420	Panel Layout
1420 - 1430	Recap
1430	<i>Lunch & End of Day Four</i>

Day 5

0730 - 0930	Other Electrical Documents
0930 - 0945	<i>Break</i>
0945 - 1100	Standardization of Symbols
1100 - 1230	Schematics Exercises
1230 - 1245	<i>Break</i>
1245 - 1345	Qualifications of Testing Organizational & Personnel
1345 - 1400	Course Conclusion
1400 - 1415	POST-TEST
1415 - 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

Practical Sessions

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



Course Coordinator

Mari Nakintu, Tel: +971 230 91 714, Email: mari1@haward.org