



COURSE OVERVIEW EE0625
High Voltage Electrical Safety
(IEC/NFPA)

Course Title

High Voltage Electrical Safety (IEC/NFPA)

Course Date/Venue

Session 1: August 19-23, 2024/Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Session 2: November 18-22, 2024/Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE



Course Reference

EE0625



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.

High voltage electrical systems require the special application of maintenance, repair, test, and safety procedures. Personnel must be trained in special precautions to ensure both personnel and workplace safety. OSHA requires training for all qualified employees performing operations or maintenance work, or who have access to electrical power generation, transmission and distribution installations as well as HSE personnel who are in charge of the safety and health of the employees, public and facilities.



This course covers the knowledge and skills needed to safely work with energized high-voltage high-energy electric power systems. Principles and procedures for the safe operation and maintenance of high voltage systems are covered. Insulated hand tools, "hot-sticks", proper grounding procedures, proper protective clothing, and thorough job-planning procedures are stressed throughout the course. Properties of electric charge, energy, electric potential, dielectric stress, capacitive and inductive coupling, and material behavior in electromagnetic fields are covered. The effects of electrical energy on humans and various protection concepts are addressed, as are basic first aid practices. Differential protection schemes, insulation materials, Faraday cages, equi-potential grounding, live-line tools, and isolation techniques are covered from both the technical and practical perspectives.



Various OSHA, IEEE, IEC, European and NFPA safety procedures are reviewed. In this interactive course, group exercises include the development of safe-work protocols, use of lockout/tagout (LOTO), maintenance task rehearsal, and equipment preparation. Calculations of fault current, arc-flash hazards, and proper PPE selection are studied. Other technical topics covered include insulation testing (IR/PI/DAR/DD), four-wire Kelvin low-resistance testing, corona detection by ultrasonic and RF detectors, and signature analysis using an infrared imager.

Successful course participants who attend the course and pass competency exam, will be certified to work on high voltage electrical power systems. Course participants are introduced to the hazards of electrical work and the philosophies of preventing accident and minimizing outage time due to improper safety or work practices. Also included as part of the curriculum are study materials participants may use at their own pace to continue their learning experience. This course addresses OSHA training requirements established in OSHA 29 CFR 1910.269.

Course Objectives

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

- Get certified on high voltage electrical safety in accordance with OSHA, NFPA, IEC, IEEE and EN standards
- Apply proper techniques and procedures on High Voltage (HV) electrical safety in accordance with the international standards OSHA, NFPA, IEEE and EN
- Explain the electrical safety standards and regulations including voltages
- Discuss basic electricity and HV installations
- Describe HV equipment including power transformers, switches, isolators and fuses, circuit breakers, instrument transformers, surge arrestors, capacitor banks as well as earth and shunt reactors
- Recognized the characteristics and applications of gas insulated substations (GIS) and review metal-enclosed and metal clad switchgears
- Analyze motor controllers, protection relays and carryout testing and commissioning
- Illustrate test equipment and discuss electrical switching as well as electrical and special hazards
- Apply hazardous area classification, classify hazardous materials, identify and control ignition sources, discuss HAC standards, identify and reduce/eliminate the risk and select electrical and equipment in hazardous areas
- Employ safety management and review de-energized and energized work
- Identify confined space as well as apply permit to work procedures and implementation
- Carryout personnel protection and emergency planning as well as identify portable cables



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, sample video clips of the instructor’s actual lectures & practical sessions during the course conveniently saved in a **Tablet PC**.

Who Should Attend

This course is designed for electrical engineers, industrial & utility engineers, HSE personnel and other staff exposed to high voltages. Supervisors or managers concerned with the safety of electrical workers will find this course especially useful in providing an insight into electrical safety. Course participants are introduced to the hazards of electrical work and the philosophies of preventing accident and minimizing outage time due to improper safety or work practices. Also included as part of the curriculum are study materials participants may use at their own pace to continue their learning experience. This course addresses OSHA training requirements established in OSHA 29 CFR 1910.269 and other international standards.

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.

Accommodation

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

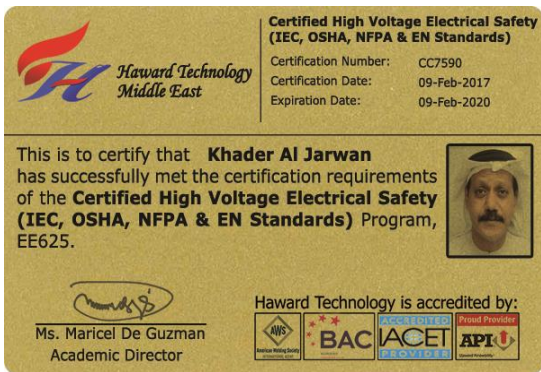
Course Certificate(s)

(1) Internationally recognized Competency Certificates and Plastic Wallet Cards will be issued to participants who completed a minimum of 80% of the total tuition hours and successfully passed the exam at the end of the course. Successful candidate will be certified to work on high voltage electrical power systems. Certificates are valid for 3 years.

Recertification is FOC for a Lifetime.

Sample of Certificates

The following are samples of the certificates that will be awarded to course participants:-



- (2) Official Transcript of Records will be provided to the successful delegates with the equivalent number of ANSI/IACET accredited Continuing Education Units (CEUs) earned during the course.

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Haward Technology Middle East

Continuing Professional Development (HTME-CPD)



CEU Official Transcript of Records

TOR Issuance Date: 09-Feb-17

HTME No. PAR213886

Participant Name: Khader Al Jarwan

| Program Ref. | Program Title | Program Date | No. of Contact Hours | CEU's |
|--------------|--|----------------------|----------------------|-------|
| EE625 | Certified High Voltage Electrical Safety (IEC, OSHA, NFPA & EN Standards) | February 05-09, 2017 | 30 | 3.0 |

Total No. of CEU's Earned as of TOR Issuance Date **3.0**

TRUE COPY



Maricel De Guzman
Academic Director

Haward Technology has been approved as an Authorized Provider by the International Association for Continuing Education and Training (IACET), 1760 Old Meadow Road, Suite 500, McLean, VA 22102, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2013 Standard which is widely recognized as the standard of good practice internationally. As a result of their Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for programs that qualify under the ANSI/IACET 1-2013 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 Association 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 is accredited by











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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.

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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.

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. William Hardi is a **Senior Electrical Engineer** with almost **35** years of extensive experience within the **Oil, Gas, Petrochemical, Refinery & Power** industries. His expertise widely covers in the areas of **Power System Analysis, Power System Generation and Distribution, Electric Power System Design, Maintenance, Testing & Troubleshooting, Transformer Protection, Transformer Problem and Failure Investigations, Power System Operation and Control, Fault Analysis in Power Systems, 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, Oil Purification and High Voltage Maintenance, HT Switch Gear -Testing, Safe Operating, Maintenance, Inspection & Repairs on LV & HT Cables - Testing (Pulse & Megger), Line Patrol in Low Voltage & Distribution, Transmission, Operating Principles up to 132KV, Abnormal Conditions & Exceptions, Commissioning & Testing, Transformer Inspections & Repairs, Live Line Work up to 33KV, Basic Power System Protection, High Voltage Operating Preparedness Phasing (110V to 132KV), HV Operating & Fault Finding (up to 132KV), Maintenance & Construction Supervision, Line Construction & Maintenance up to 132KV, VSD/VFD Installations & Testing, Electrical Panel Design, VSD/VFD Installations & Testing, Instrument Installation and wiring, Programmable Logic Controller (PLC), PLC for Process Control & Automation, ABB Drives and other PLC Starters, PLC Starters – Commissioning & fault-finding, , AC/DC Supplies & Change Over Systems, AC & DC Winders and VLF Testing, Soft Starters – VSD's etc.,**

During Mr. Hardi career life, he has gained his practical experience through several significant positions and dedication as the **Branch Manager, Maintenance Manager, Project Manager, Site Superintendent, Construction Supervisor, Shift Supervisor, Maintenance & Production Shift Supervisor, HT Specialist, Electrical & Instrumentation Supervisor, High Voltage Specialist & Commissioning Supervisor, Electrical Supervisor, Principal Technical Official, Winder & Conveyor Technician and Instructor/Trainer** from various companies, like the Armcoil Africa, JR Compressors, ELGER Electrical, Saaiplaas 3 Shaft, ESCOM and Target Mining.

Mr. Hardi is a **Qualified Electrician** certified by the Engineering Trades Training Board. Further, he is a **Certified Instructor/Trainer** and has delivered various trainings, seminars, conferences, workshops and courses globally.



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 | Registration & Coffee |
| 0800 – 0815 | Welcome & Introduction |
| 0815 – 0830 | PRE-TEST |
| 0830 – 1045 | Standards & Regulations IEC • OSHA • NFPA • IEEE • EN |
| 1045 – 1145 | Standard Voltage LV • MV • HV • EHV • UHV |
| 1145 – 1200 | Break |
| 1200 – 1230 | Basic Electricity Direct Current |
| 1230 – 1300 | Basic Electricity (cont'd) Alternating Current |
| 1300 – 1315 | Break |
| 1315 – 1420 | Basic of HV Installations |
| 1420 – 1430 | Recap |
| 1430 | Lunch & End of Day One |

Day 2

| | |
|-------------|---|
| 0730 – 0930 | HV Equipment – Power Transformers Types • Connections • Hazards & Testing • Troubleshooting • High Pot Testing • Step Regulators |
| 0930 – 0945 | Break |
| 0945 – 1045 | HV Equipment – Switches, Isolators & Fuses Characteristics and Functions • Types & Ratings • Testing & Hazards |
| 1045 – 1145 | HV Equipment – Circuit Breakers Characteristics and Functions • Types & Ratings • Testing & Hazards |
| 1145 – 1230 | HV Equipment – Instrument Transformers Characteristics and Functions • Types & Ratings • Connections • Grounding • Testing |
| 1230 – 1245 | Break |
| 1245 – 1330 | HV Equipment – Surge Arrestors Characteristics and Functions • Types & Ratings • Testing & Hazards |
| 1330 – 1420 | HV Equipment – Capacitor Banks Theory of Operation • Application & Hazards |
| 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

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|-------------|---|
| 0730 – 0830 | HV Equipment – Earth & Shunt Reactors Characteristics and Functions • Types |
| 0830 – 0900 | Gas Insulated Substations (GIS) Characteristics • Applications |





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|-------------|---|
| 0900 – 0930 | Metal-Enclosed & Metal Clad Switchgears Characteristics • Cubicles and Equipments |
| 0930 – 0945 | Break |
| 0945 – 1045 | Motor Controllers |
| 1045 – 1145 | Protection Relays |
| 1145 – 1230 | Testing & Commissioning |
| 1230 – 1300 | Test Equipment Ammeters, Ohmmeters, Voltmeters • Phase Angle Meters • Phasing Sticks/Devices • Oscilloscopes • Voltage Testers-Wiggy, etc. • Thumpers • Relay & Meter Test Equipment • Insulation Testers |
| 1300 – 1315 | Break |
| 1315 – 1420 | Electrical Switching Switching Programmes • Loads • Transformers • Capacitors • Switches and Isolators |
| 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 Three |

Day 4

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|-------------|---|
| 0730 – 0830 | Electrical Hazards Electrical Shock and Effects • Electrical Arc • Safety Distances • Arc Blast • Accident Discussions |
| 0830 – 0930 | Special Hazards Unique Designs • Special Operating Requirements |
| 0930 – 0945 | Break |
| 0945 – 1100 | Hazardous Area Classification (HAC) Defining Hazardous Areas (Zoning) • Why Area Classification? • Classifying Hazardous Materials • Ignition Sources – Identification and Control • Hazardous Area Classification (HAC) Standards • Identify & Reduce/Eliminate the Risk • Selection of Electrical Equipment in Hazardous Areas |
| 1100 – 1215 | Safety Management Quality Management System • Work Health and Safety System • Forms and Records • Audits • Policies • Costs |
| 1215 – 1230 | Break |
| 1230 – 1420 | De-Energized Work Policies and Procedures • Voltage Detection Equipment • Lock and Tag Out • Permit to Work (PTW) • Grounds Grounds/Grounding • Personal Protective Grounds |
| 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

| | |
|-------------|---|
| 0730 – 0830 | Energized Work Policies and Procedures • Recognition • Work Zones (Controlled Areas) • Work Clearances • Planning A Job • Proper Tools |
| 0830 – 0900 | Confined Space Scope and Application • Training Requirements • Duties of Employers and Employees |

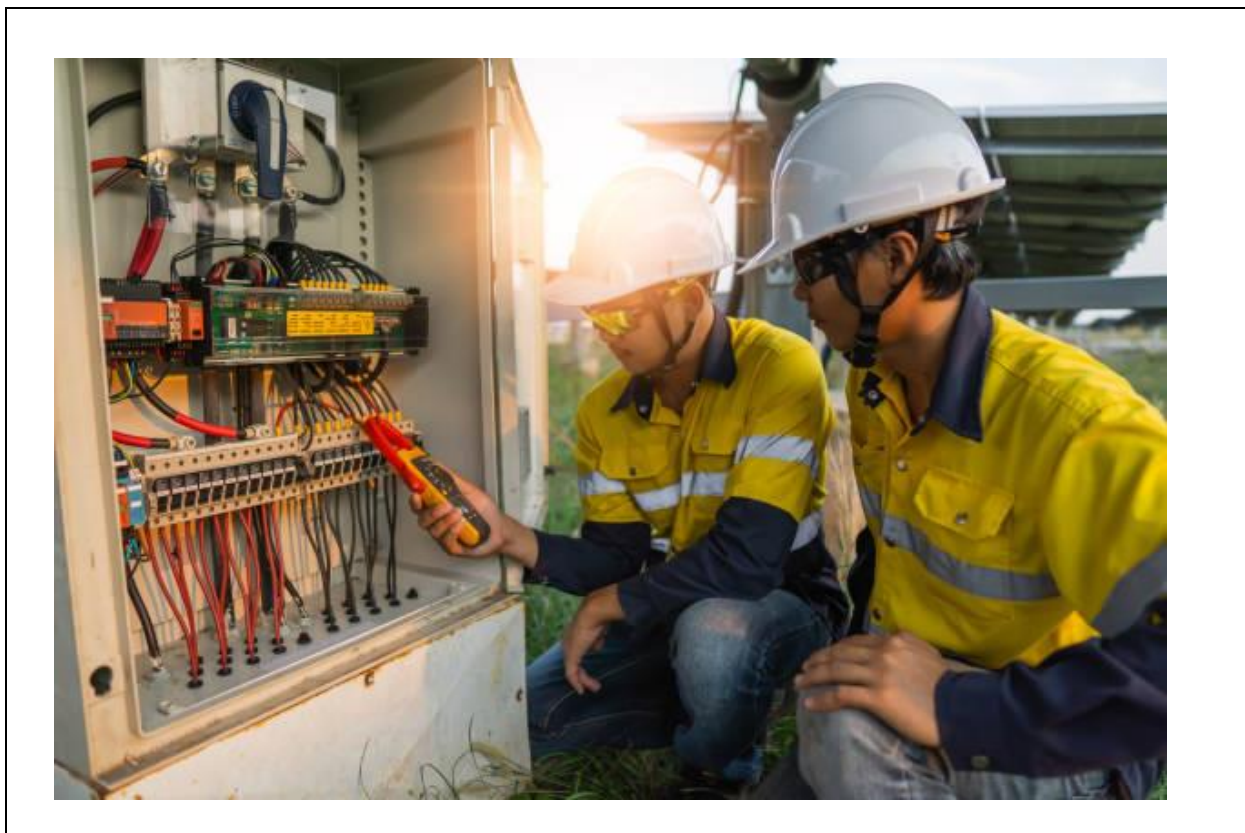




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| 0900 - 0930 | Permit to Work (PTW) Procedure & Implementation Guidance Notes on Permit to Work (Site Specific if Requested) • Legal Responsibilities • Permit to Work (PTW) Key Players • Relationship between those Issuing Permits and those Working under PTW • When Should a Permit be Used • Who Issues Them • PTW Documentation • PTW Implementation |
| 0930 - 0945 | Break |
| 0945 - 1045 | Personnel Protection Personal Protective Equipment (PPE) • Rubber Gloves/Blanket • Flash Suits • Eye Protection • Hard Hats • Explosion Protection |
| 1045 - 1145 | Emergency Planning Communications • Electrical Fires and Fire Fighting • Phone Numbers • Panic Button • Tools/Equipment |
| 1145 - 1200 | Break |
| 1200 - 1300 | Portable Cables Application • Hazards |
| 1300 - 1315 | Course Conclusion Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course |
| 1315 - 1415 | COMPETENCY EXAM |
| 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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