COURSE OVERVIEW EE0686
HV/MV Underground Cables: Specification, Installation, Commissioning and Jointing

Course Title
HV/MV Underground Cables: Specification, Installation, Commissioning and Jointing

Course Reference
EE0686

Course Duration/Credits
Five days/2.25 CEUs/22.5 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	April 07-11, 2025	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	July 13-17, 2025	TBA Meeting Room, Taksim Square Hotel, Istanbul, Turkey
3	October 19-23, 2025	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
4	December 14-18, 2025	Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA

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 HV/MV Underground Cables: Specification, Installation, Commissioning and Jointing. It covers the high-voltage (HV) and medium-voltage (MV) underground cables and its importance and applications in the power distribution network; the types, standards and components of HV/MV cables; the electrical properties of cables; and the factors to consider in selecting HV/MV cables including cable sizing and derating factors.

Further, the course will also discuss the safety procedures and risk assessments for cable installation; the trenching techniques and duct installation; the cable laying techniques, maintaining proper bending radius and calculating and managing pulling tension; the thermal considerations and proper jointing techniques, termination techniques and testing of joints and terminations; and the pre-commissioning tests, visual inspections and continuity tests, high voltage testing methods and safety precautions.

During this interactive course, participants will learn the partial discharge testing, thermal imaging to detect hotspots and defects and continuous monitoring systems for cable health; the proper documentation and reporting, best practices for operating HV/MV cable systems and load management and operational safety; the routine and preventive maintenance for HV/MV cables; the inspection schedules and maintenance procedures; the common faults in HV/MV cables and their causes; the techniques for fault detection and location; the repair of damaged HV/MV cables; developing emergency response plans; the apply rapid restoration techniques and procedures.

Course Objectives

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

- Apply and gain an in-depth knowledge on the specification, installation, commissioning and jointing of HV/MV underground cables
- Discuss high-voltage (HV) and medium-voltage (MV) underground cables and its importance and applications in the power distribution network
- Identify the types, standards and components of HV/MV cables and the electrical properties of cables
- Recognize the factors to consider in selecting HV/MV cables including cable sizing and derating factors
- Carryout safety procedures and risk assessments for cable installation including trenching techniques and duct installation
- Apply cable laying techniques, maintaining proper bending radius and calculating and managing pulling tension
- Discuss thermal considerations and apply proper jointing techniques, termination techniques and testing of joints and terminations
- Employ pre-commissioning tests, visual inspections and continuity tests, high voltage testing methods and safety precautions
- Carryout partial discharge testing, thermal imaging to detect hotspots and defects and continuous monitoring systems for cable health
- Apply proper documentation and reporting, best practices for operating HV/MV cable systems and load management and operational safety
- Implement routine and preventive maintenance for HV/MV cables as well as inspection schedules and maintenance procedures
- Identify the common faults in HV/MV cables and their causes and apply techniques for fault detection and location
- Repair damaged HV/MV cables, develop emergency response plans and apply rapid restoration techniques and procedures

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 hv/mv underground cables: specification, installation, commissioning and jointing for electrical engineers, technicians and electricians, construction managers and other technical staff.

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. Certificates are valid for 5 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.

Haward Technology Middle East

Continuing Professional Development (HTME-CPD)

CEU Official Transcript of Records

TOR Issuance Date: 14-Nov-23

HTME No. 74851

Participant Name: Waleed Al Habeeb

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
EE0686-IH	HV/MV Underground Cables: Specification, Installation, Commissioning and Jointing	November 10-14, 2023	30	3.0

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

TRUE COPY

Jaryl Castillo
Academic Director

Haward Technology has been approved as an Accredited Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this approval, Haward Technology has demonstrated that it complies with the ANSI/IACET 1-2018 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 1-2018 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

P.O. Box 26070, Abu Dhabi, United Arab Emirates | Tel.: +971 2 3091 714 | E-mail: info@haward.org | Website: www.haward.org

Certificate Accreditations

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**. 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 **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.

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 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. Ken Steel is a **Senior Electrical & Instrumentation Engineer** with over **30 years** of extensive experience. His expertise widely covers **Electrical Motors Testing**, **Heat Tracing** & Insulation Installation & Testing, **HV Terminations**, **High & Low Voltages** on Overhead Cranes, **HV/MV Cable Splicing**, **Cable & Over Head Power Line**, **HV/MV Switchgear, HV Cable** Design, **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, **Cable** Splicing & Termination, **High Voltage** Electrical Safety, **LV**, **MV & HV Cable** Installations & Properties, **LV Substation**, **MV & LV Cable**, **UPS Systems**, **MV & LV** Direct on Line Motor Drives, **MV & LV** VSD Motor Drives, **MV & LV** Soft Starter Motor Drives, **LV Two Speed Motor Drives**, Underground **Transformer Oil Containment Tank**, **Electrical & Instrumentation Construction** Installation, 1500KW, 1000KW, 1752KW **Diesel Power Plant Installation**, **110KV Overhead Line**, **110KV Outdoor Switchgear**, 110KV/10KV 6500KVA **Transformer**, **Transformer Substation**, 1600KVA 10KV/0.4KV & 2 Off 1000KVA **Diesel Generators**, 1600KVA 10KV/0.4KV & 1650KVA **Diesel Generator**, **110KV/35KV/10KV Substation**, 110KV/10KV **Transformers**,110KV & 2 Off 6KV **Overhead Lines**, 34.5KV,13.8KV ,4.16KV & 480V **Switchgear**, 4.16KV & 480V MCC, **Transformers & Motor Drives** Substations, **Diesel Driven Generators**, **Overhead Cranes**, **Overhead Cranes & HVAC Units**, **AC & DC Drives**, **Data Logger**, **Electrical, Instrumentation & Mechanical** Installation Maintenance, Slab Mills, Pre Heat Ovens, Hydraulic Shears, Stamping Machine, Gearboxes, Rollers, Pumps, Valves, Electro Magnets & Pump House Operation, Boilers Construction And Commissioning, Valve Calibration & Testing, Level Gauges, Pressure & Flow Transmitters Installation & Calibration, Pressure & Leak Testing of Boilers, Leak Testing, SMP, Elect, I&C, F&G, HVAC & Utility Services, Nitrogen Leak Test Operations, Steam Blowing Activities, SMP, Elect, I&C, F&G, HVAC & Utility Services, PTW Issue (PA/AC), Installation & Mechanical Piping and Hydro Testing & Leak Testing of Lines Installation.

During Mr. Steel's career life, he has gained his practical experience through several significant positions and dedication as the **3GP PBF & Boilers SC Commission Support**, **SC Site Execution Superintendent**, **E&I Construction Superintendent**, **High Voltage Construction Supervisor**, **Control & Power Construction Supervisor**, **Electrical & Instrumentation Supervisor**, **Electrical Technician**, **Construction Support Electrical Engineer**, **E&I Engineer**, **Electrical/Instrumentation Site Supervisor**, **Q.A/Q.C Inspector**, **Electrical/ Instrumentation Technician**, **Maintenance Fitter Instrumentation Technician**, **Millwright**, **Apprentice Millwright** and **Senior Instructor/Lecturer** for Tengiz Chevron Oil Kazakhstan, Al Jubail Saudi Arabia, Escravos Delta state Nigeria, Lurgi S.A, SuD Chemie Sasol Catalysts, J C Groenewalds Construction (LTA), Tycon (Goodyear S.A.), Dragline Construction and Iscor Vanderbijlpark.

Mr. Steel has a **Diploma** in **Electronics Mechanic**. Further, he is a **Certified Instructor/Trainer** and delivered numerous trainings, courses, workshops, seminars and conferences internationally.

Course Fee

Abu Dhabi	**US$ 6,250** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Istanbul	**US$ 6,750** 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$ 6,250** per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	**US$ 6,250** 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	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Overview of HV/MV Underground Cables*** *Introduction to High-Voltage (HV) & Medium-Voltage (MV) Underground Cables • Importance & Applications in the Power Distribution Network*
0930 - 0945	*Break*
0945 - 1100	***Cable Types & Standards*** *Types of HV/MV Cables (XLPE, PILC, Etc.) • Relevant Standards & Specifications (IEC, IEEE, Etc.)*
1100 - 1200	***Cable Construction & Materials*** *Components of HV/MV Cables (Conductor, Insulation, Shielding, Armor, Sheath) • Materials Used & Their Properties*
1200 - 1230	***Electrical Properties of Cables*** *Electrical Characteristics: Capacitance, Inductance, Resistance, Impedance • Current Carrying Capacity & Voltage Rating*
1230 - 1245	*Break*
1245 - 1345	***Cable Selection Criteria*** *Factors to Consider in Selecting HV/MV Cables (Load, Environment, Installation Conditions) • Cable Sizing & Derating Factors*
1345 - 1420	***Hands-On Session: Identifying Cable Types & Specifications*** *Practical Exercises on Identifying Different Types of HV/MV Cables • Understanding Cable Specifications & Datasheets*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 - 0830	***Site Preparation & Safety*** *Preparing the Installation Site • Safety Procedures & Risk Assessments for Cable Installation*
0830 - 0930	***Trenching & Ducting*** *Trenching Techniques & Duct Installation • Depth Requirements & Protection Measures*
0930 – 0945	*Break*
0945 – 1100	***Cable Laying Techniques*** *Methods of Laying HV/MV Cables (Direct Burial, Ducts, Trays) • Handling & Pulling Techniques to Prevent Cable Damage*
1100 - 1230	***Bending Radius & Tension*** *Importance of Maintaining Proper Bending Radius • Calculating & Managing Pulling Tension*
1230 - 1245	*Break*
1245 - 1345	***Thermal Considerations*** *Heat Dissipation & Thermal Resistivity of the Soil • Techniques to Enhance Thermal Performance (Backfilling, Thermal Resistivity Materials)*
1345 - 1420	***Hands-On Session: Cable Laying & Trenching*** *Practical Exercises on Laying Cables in a Simulated Environment • Demonstrating Trenching & Duct Installation Techniques*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3: Tuesday, 10th of December 2024

0730 - 0830	***Cable Jointing & Termination*** *Importance of Proper Jointing & Termination for Reliability • Types of Joints & Terminations (Heat Shrink, Cold Shrink, Pre-Molded)*
0830 - 0930	***Preparation for Jointing*** *Cable Preparation Techniques (Stripping, Cleaning, Preparing Conductors) • Tools & Equipment Used in Jointing*
0930 – 0945	*Break*
0945 – 1100	***Jointing Techniques*** *Step-By-Step Jointing Procedures for HV/MV Cables • Quality Control & Inspection During Jointing*
1100 - 1230	***Termination Techniques*** *Methods of Cable Termination (Indoor, Outdoor, GIS Terminations) • Stress Control & Sealing Techniques*
1230 - 1245	*Break*
1245 - 1345	***Testing of Joints & Terminations*** *Electrical Testing Methods (VLF, PD Testing, Tan Delta) • Mechanical Testing & Inspection*
1345 - 1420	***Hands-On Session: Jointing & Termination*** *Practical Exercises on Jointing & Terminating HV/MV Cables • Performing Electrical Tests on Completed Joints & Terminations*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 - 0830	***Pre-Commissioning Tests*** *Importance of Pre-Commissioning Tests • Visual Inspections & Continuity Tests*
0830 - 0930	***High Voltage Testing*** *High Voltage Testing Methods (Hi-Pot, DC Testing, AC Testing) • Safety Precautions & Interpreting Test Results*
0930 – 0945	*Break*
0945 – 1100	***Partial Discharge Testing*** *Importance of Partial Discharge (PD) Testing for Cable Health • PD Testing Techniques & Equipment*
1100 - 1230	***Thermal Imaging & Monitoring*** *Using Thermal Imaging to Detect Hotspots & Defects • Continuous Monitoring Systems for Cable Health*
1230 - 1245	*Break*
1245 - 1345	***Documentation & Reporting*** *Recording Test Results & Maintaining Documentation • Reporting Standards & Practices*
1345 - 1420	***Hands-On Session: Commissioning & Testing*** *Practical Exercises on Conducting Commissioning Tests • Using Test Equipment & Interpreting Results*
1420 – 1430	***Recap***
1300	*End of Day Four*

Day 5

0730 – 0830	***Operation of HV/MV Cable Systems*** *Best Practices for Operating HV/MV Cable Systems •Load Management & Operational Safety*
0830 - 0900	***Maintenance Strategies*** *Routine & Preventive Maintenance for HV/MV Cables • Inspection Schedules & Maintenance Procedures*
0900 - 0930	***Fault Detection & Location*** *Common Faults in HV/MV Cables & Their Causes • Techniques for Fault Detection & Location (TDR, Bridge Methods)*
0930 – 0945	*Break*
0945 - 1100	***Repair Techniques*** *Methods for Repairing Damaged HV/MV Cables • Quality Assurance & Testing After Repair*
1100 - 1230	***Emergency Response & Restoration*** *Developing Emergency Response Plans • Rapid Restoration Techniques & Procedures*
1230 - 1245	*Break*
1245 - 1345	***Hands-On Session: Fault Detection & Repair*** *Practical Exercises on Detecting & Locating Faults • Demonstrating Repair Techniques & Post-Repair Testing*
1345 - 1400	***Course Conclusion***
1400 - 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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