

COURSE OVERVIEW EE0770

Certified HV/MV Cable Splicing, Jointing & Termination

Course Title

Certified HV/MV Cable Splicing, Jointing & Termination

Course Date/Venue

Session 1: September 01-05, 2024/Boardroom, Warwick Hotel Doha, Doha, Qatar
Session 2: December 08-12, 2024/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE



Course Reference

EE0770



Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes practical sessions and exercises where participants carryout HV/MV cable jointing, termination, splicing and testing. Theory learnt in the class will be applied using the latest heat-shrink jointing and termination methods suitable for in-class training.



The range of voltage and capacity of power transmitted through cables is showing a steady increase over the years. Environmental concerns, aesthetic issues, lack of transmission corridors and difficulty in routing overhead lines in crowded human habitats are some of the reasons for the explosive growth of cable technology well into the new voltage range. Due to physical limits on cable lengths for manufacturing and packaging, joints in cable become inevitable, particularly in the context of the utility sector. The cables need to be also terminated at sending and receiving end equipment, a very wide variety of them, in utility as well as industry applications and these calls for appropriate cable termination accessories.



Cable terminations and joints form the weakest link in any distribution system. Also, a failed joint in an underground distribution system is much more difficult to locate and repair compared to any similar problem in overhead distribution systems. This means that we should do our utmost to achieve a good joint or termination, which can give years of trouble-free service.



The quality of a joint or termination depends to a large extent on the skill of cable joiner/splicer. The aim of a cable joiner/splicer must therefore be to obtain a joint which electrical properties are as good as the original cable both in electrical and mechanical terms. The design of cable splicing, jointing and termination accessories is based on this perception. Dependence on operator-skill is sought to be reduced to the extent possible by good choice and quality of jointing materials, though such dependence cannot be totally eliminated.

This course is designed to provide participants with a detailed and an up-to-date overview of HV/MV cable splicing, jointing, terminating and QA/QC. It covers the cable jointing and the different types of cables, insulation materials, terminations and joints; the construction of cables, conductor materials and configurations; the different applications and voltages of cables; the various types of cable connectors, materials and method of connection; the theory of joints and terminations; the stress control and the effect of joints and terminations on stress gradients; the areas requiring stress control; the cable jointing, splicing, testing and termination; the applicable standards, types of tests, routine tests and its limitations; the training and certification of personnel involved; the reasons for cable failures and analysis of failures with a predictive approach; and the new trends and technologies utilized in the industry.

Course Objectives

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

- Apply proper techniques in HV/MV cable splicing, jointing, terminating and testing
- Discuss cable jointing and the different types of cables, insulation materials, terminations and joints
- Describe the construction of cables, conductor materials and configurations, the different applications and voltages of cables
- Identify the various types of cable connectors, materials and method of connection
- Apply the theory of joints and terminations
- Calculate stress control and determine the effect of joints and terminations on stress gradients and the areas requiring stress control
- Practice cable jointing, splicing, testing and terminating
- Implement the applicable standards, the types of tests, routine tests and its limitations and the training and certification of personnel involved
- Find reasons for cable failures and perform analysis of failures with a predictive approach
- Apply new trends and technologies utilized in the 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 material conveniently saved in a **Tablet PC**.*



Who Should Attend

This course provides an overview of all significant aspects and considerations of HV/MV cables for those who are involved in splicing, jointing, termination and testing of power cables. This includes electrical engineers, instrumentation and control engineers, project engineers, maintenance engineers, power system protection and control engineers, building service designers, data systems planners and managers as well as electrical, instrumentation and control technical staff.

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

Doha	US\$ 6,750 per Delegate. 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.

Accommodation

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





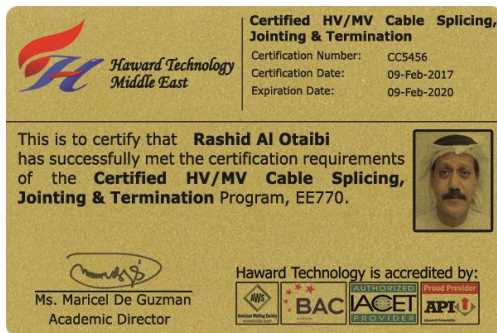
Course Certificate(s)

(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. Certificates are valid for 5 years.

Recertification is FOC for a Lifetime.

Plastic Wallet Card Certificates

The following wallet card certificate is a sample of the wallet card certificates that will be issued to successful candidates:





- (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: 12-Oct-17
HTME No. PAR14166
Participant Name: Hamoud Al Foura

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
EE0770	Certified HV/MV Cable Splicing, Jointing & Termination	October 08-12, 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: -

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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.

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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. 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 **Electrical Safety, HV Cable Design, Cable Splicing & Termination, Cable Jointing Techniques, High Voltage Electrical Safety, HV/MV Cable Splicing, High Voltage Circuit Breaker Inspection & Repair, Cable & Over Head Power Line, High Voltage Power System Safe**

Operation, High Voltage Safety, High Voltage Transformers, Safe Operation of High Voltage & Low Voltage Power Systems, Power System Equipment, Distribution Network System, 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, Substation Site Inspection, 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 Drawing & Schematics, 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.





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 – 0900	Introduction
0900 – 0930	Course Overview Need for Cable Joints and Terminations • Cables- Historic Perspective • Types of Cables • Types of Insulation Materials • Basic Types of Terminations and Joints • Installation Aspects; Reducing the Number of Joints by Proper Planning • Standards, Testing and Failures
0930 – 0945	Break
0945 – 1100	Cables Basic Construction • Conductor Materials and Configurations • Insulation Materials for Different Applications and Voltages • Use of Screen in HV Cables
1100 – 1200	Cables (cont'd) Use of Armor for Ground Continuity and Mechanical Protection • Special Aspects of Single Core Cables • Voltage Rating of Cables and Impact of System Grounding Method on Voltage Rating • Stress Distribution in Single Core and Multi-Core Power Cables
1200 – 1215	Break
1215 – 1420	Cables (cont'd) Electrical Breakdown of Insulating Materials • MV Cables • HV Cables Using XLPE Insulation • Treeing in XLPE and Need for End Sealing of Cables in Storage • Basic Manufacturing Process
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

0730 – 0930	Cable Connectors Materials • Types of Connectors for Cable Terminations and Joints • Current Path • Method of Connections • Comparison • Contact Resistance • Preferred Methods in Practice for Different Cable Ratings • Contact of Dissimilar Materials and Galvanic Effects; Use of Bi-Metal Accessories
0930 – 0945	Break
0945 – 1100	Joints & Terminations-Theory Basic Approaches • Broad Classification of Joints/Termination Approach • Comparative Merits • Prefabricated
1100 – 1200	Joints & Terminations-Theory (cont'd) Site Fabricated • Additional Requirements of Outdoor Terminations • Reconstitution of Cable Properties • Connectivity for Cable Screen and Armor • Mechanical Protection of Joints and Terminations





1200 – 1215	Break
1215 – 1420	Practical Session #1
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

0730 – 0930	Stress Control Effect of Joints and Terminations on Stress Gradients • Areas Requiring Stress Control • Basics of Stress Control Approach
0930 – 0945	Break
0945 – 1100	Jointing & Termination Practice Kits for Joints and Terminations • Shelf Life Issues • Importance of Matching Diameter of Insulated Conductor with Kit Specifications in Pre-Fabricated Kits • Preparation of Cable for Termination and Jointing
1100 – 1200	Jointing & Termination Practice (cont'd) Connection • Reconstitution of Cable Properties • Continuity and Grounding Aspects • Sealing • Healthiness of Joint/Termination • Installation Aspects for Joints • Access for Repairs
1200 – 1215	Break
1215 – 1420	Practical Session #2
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

0730 – 0930	Standards & Testing International/National Standards • Type Tests • Limitations
0930 – 0945	Break
0945 – 1100	Standards & Testing (cont'd) Routine Tests • Training and Certification of Personnel
1100 – 1200	Terminations to Equipment Terminations to Indoor Switchgear • Terminations to Electrical Machines • Termination of Outdoor HV Installations • Terminations to GIS Installations • Importance of Correct Orientation of Terminations
1200 – 1215	Break
1215 – 1420	Practical Session #3
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 – 0930	Failures & Analysis <i>Reasons for Failures • Documentation of Work • Documentation of Failures</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Failures & Analysis (cont'd) <i>Analysis of Failures • Predictive Approach</i>
1100 - 1200	New Trends <i>Reasons for Increasing Preference to Underground Cables • New Technologies for Very High Capacities and Voltages</i>
1200 - 1215	<i>Break</i>
1215 - 1300	New Trends (cont'd) <i>EHV XLPE • High Temperature Superconductivity in Cables and Likely Impact on Current Practices</i>
1300 - 1315	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1315 – 1415	COMPETENCY EXAM
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>



Practical Sessions

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout splicing and jointing, termination exercises using heat-shrink kits, suitable for classroom training.



Course Coordinator

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