



COURSE OVERVIEW EE0770

Professional Training & Certification for Technicians in LV/HV Cable Termination & Joining Up to 11KV

Course Title

Professional Training & Certification for Technicians in LV/HV Cable Termination & Joining Up to 11KV

Course Date/Venue

August 19-23, 2024/TBA Meeting Room, Park Rotana, Mussafa, Abu Dhabi, UAE

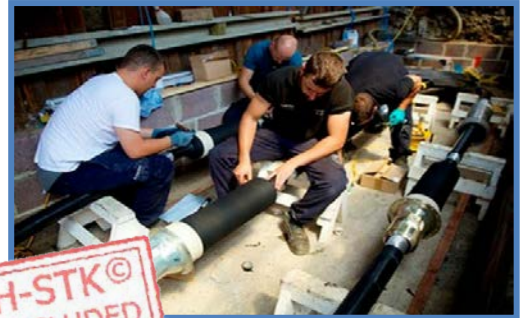
Course Reference

EE0770

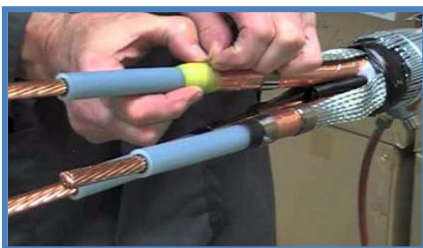
Course Duration/Credits

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 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 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.

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.

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *



Haward Technology Middle East
Continuing Professional Development (HTME-CPD)



CEU Official Transcript of Records

TOR Issuance Date: 14-Nov-22
HTME No. 74852
Participant Name: Waleed Al Habeeb

Program Ref.	Program Title	Program Date	No. of Contact Hours	CEU's
EE0770	Professional Training & Certification for Technicians in LV/HV Cable Termination & Joining Up to 11KV	November 10-14, 2022	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

* Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology * CEUs * Haward Technology *



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.

-  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 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 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.



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 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: Monday, 19th of August 2024

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: Tuesday, 20th of August 2024

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: Wednesday, 21st of June 2024

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: Thursday, 22nd of July 2024

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: Friday, 23rd of July 2024

0730 – 0930	Failures & Analysis Reasons for Failures • Documentation of Work • Documentation of Failures
0930 – 0945	Break
0945 – 1100	Failures & Analysis (cont'd) Analysis of Failures • Predictive Approach
1100 - 1200	New Trends Reasons for Increasing Preference to Underground Cables • New Technologies for Very High Capacities and Voltages
1200 - 1215	Break
1215 - 1300	New Trends (cont'd) EHV XLPE • High Temperature Superconductivity in Cables and Likely Impact on Current Practices
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

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

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org

