COURSE OVERVIEW EE0660
Earthing, Bonding, Lightning & Surge Protection of Electrical & Electronic Systems & Equipment

Course Title
Earthing, Bonding, Lightning & Surge Protection of Electrical & Electronic Systems & Equipment



Course Date/Venue
Session 1: May 30-June 03, 2027/Meeting Plus 9, City Centre Rotana Doha Hotel, Doha, Qatar
Session 2: September 19-23, 2027/Meeting Plus 9, City Centre Rotana Doha Hotel, Doha, Qatar



Course Reference
EE0660

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.

This course is designed to provide participants with a detailed and an up-to-date overview of earthing, bonding, lightning and surge protection of electrical and electronic systems & equipment. It covers the recommended design and installation practices for earthing and bonding; the earthing for building electrical systems; the typical rules to be applied for the electrical and electronic systems & equipment; and the earthing and noise control.

During this interactive course, participants will learn how to detect electrical faults on equipment; identify the various applications of earthing and bonding; emphasize the need for a lightning protection system; apply surge and transient protection; and carryout power conditioning.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on earthing, bonding, lightning and surge protection of electrical and electronic systems & equipment
- Implement the recommended design and installation practices for earthing and bonding
- Practice earthing for building electrical systems and determine the typical rules to be applied for the electrical and electronic systems & equipment
- Apply earthing and noise control and detect electrical faults on equipment
- Identify the various applications of earthing and bonding and emphasize the need for a lightning protection system
- Discuss surge and transient protection and carryout power conditioning

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 earthing, bonding, lightning and surge protection for those who are in charge of electrical and electronic equipment and systems. This includes electrical engineers, instrumentation engineers, control engineers, power protection engineers, designers, planners and other technical staff.

Training Methodology

Our courses employ an interactive, learner-centred methodology that integrates theoretical knowledge with practical application. The training is delivered through a suitable combination of some or all of the following methods, selected according to the course content and learning objectives:

- Instructor-led presentations and facilitated discussions
- Practical workshops and participant presentations
- Hands-on exercises and real-world case studies
- Equipment demonstrations and technical drawings
- Hardware- and software-based simulations
- Gamification & Role Play in soft-skills courses only
- Virtual Reality (VR) and Augmented Reality (AR)
- Instructional videos and other relevant training resources

This blended approach encourages active participation, strengthens practical skills and supports the effective application of acquired knowledge in the workplace.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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

Haward's 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**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

Accommodation

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

Course Fee

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.

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. Grant Stead, is a **Senior Electromechanical Engineer** with over **30 years** of integrated industrial experience and academic experience within **Power & Water Utilities** and Other **Energy Sectors**. His wide expertise includes **Power System Equipment**, **Electric Power System** Operation, Fundamentals of **Power System Equipment & Stability**, **Power System Planning & Economics**, Electrical **Power Instruments & Control System**, **Power Flow Analysis** of Electrical Power Systems, **Power System Generation and Distribution**, **UPS & Battery** Operation & Maintenance, **UPS** Classification, Online & Off-line **UPS Operation**, **UPS Battery** Features, **Battery Charger**, **UPS System Application**, **UPS Parallel** Operation & Strategies, **UPS System** Performance Evaluation, **Control Loop Strategies**, **UPS Converters & Inverters**, **UPS & Battery Charger** Systems, **Battery Chargers** Construction & Troubleshooting, **Battery** Design & Operation, **Battery Charger & UPS** System Prevention Maintenance, **Circuit Breakers & Switchgears**, **Electricity & Electrical Codes**, **Electrical Installations**, **Electric Motors**, **Maintenance, Grounding and Safety** for Electrical Power Substation, **Electrical Generator & Power Transformer**, Electrical Power System **Protection Relays**, **Hydraulics & Fluid Mechanics**, Engineering Services, Electrotechnology, **Fitting & Machining**, **Airconditioning** Repair & Maintenance, Trenching Machines, **Compressors** and **Diesel Engines**. He is also well-versed in Occupational Safety, Coaching & Mentoring, Project Management, Human Resources Management, Procurement Skills, Finance & Infrastructure Maintenance, Health & Safety and Quality Control, Time Management, Leadership and Management Skills, Supervising & Teambuilding Skills, Seven Habits of Highly Effective People, MS Office, Performance Manager, Budgeting & Financial Control and Presentation Skills. Currently, he is the **Operations Manager** of Damelin College wherein he manages the accredited learnership courses as per the required standards by the Sector Education and Training Authority (SETA) ensuring the proper assessment and moderation of all assessments.

During his career life, Mr. Stead worked with several prestigious companies and institutions occupying numerous challenging management and technical positions such as being the **Engineering Manager**, **Plant Maintenance Engineer**, **Operations Manager**, **Maintenance Planner**, **Maintenance Manager**, **Reliability Engineer** and **Maintenance Supervisor** for various international companies and institution.

Mr. Stead has a **Bachelor's** degree in **Mechanical Engineering**. Further, he is a **Certified Instructor/Trainer**, a Registered in South African Council for Education (**SACE**) and a **Certified Assessor & Moderator** with the Education Training & Development Practices Sector Education & Training Authority (**ETDP SETA**). He has further delivered numerous trainings, courses, workshops, seminars 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 – 0930	***Introduction & Basics*** *Fundamentals of Earthing • Bonding • Lightning • Surge Protection • Shielding*
0930 – 0945	*Break*
0945 – 1100	***Recommended Design & Installation Practices*** *Wiring and Earthing for Safety and Performance*
1100 – 1230	***Recommended Design & Installation Practices (cont'd)*** *Wiring and Distribution Systems*
1230 – 1245	*Break*
1245 – 1420	***Recommended Design & Installation Practices (cont'd)*** *Dedicated and Derived Neutral Systems • Earthing and Bonding Equipment*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0930	***Fundamentals of Earthing for Building Electrical Systems*** *Earthing of Building Systems • Which Electrical Systems Can be Operated Ungrounded • Proper Methods of Earthing Building Electrical Systems*
0930 – 0945	*Break*
0945 – 1100	***Fundamentals of Earthing for Building Electrical Systems (cont'd)*** *Location of the Service Earthing Connection • Proper Sizing of Grounded (Neutral) Conductors*
1100 – 1230	***Typical Rules to be Applied*** *Rules for Multiple Services to One Building • Rules for Low Impedance and High Impedance Systems • Rules for Bonding Requirements at Building Service Equipment • Earthing Electrodes, Systems and Conductors • Bonding Enclosures and Equipment*
1230 – 1245	*Break*
1245 – 1420	***Typical Rules to be Applied (cont'd)*** *Equipment Earthing Conductor Types • Enclosure and Equipment Earthing • Earthing of Separately Derived Systems • Earthing at More than One Building • Disconnecting Means for Separate Buildings*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0900	***Earthing & Noise Control*** *Misconceptions of Performance Earthing • Single Point versus Multi Point Techniques*
0900 – 0915	*Break*

0915 – 1100	***Earthing & Noise Control (cont'd)*** *Noise and Zero Signal Reference Grid*
1100 – 1200	***Earthing & Noise Control (cont'd)*** *Avoiding Non-Recommended Practices • Shielding*
1200 – 1215	*Break*
1215 – 1420	***Electrical Faults*** *Ground Fault Circuit Interrupters • Equipment Ground Fault Protection Systems*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0900	***Applications of Earthing & Bonding*** *Earthing and Bonding in Hazardous (Classified) Locations • Earthing and Bonding for Health Care • Earthing and Bonding for Swimming Pools, Hot Tubs and Spas • Static and Electricity: Earthing and Bonding Requirements*
0900 – 0915	*Break*
0915 – 1100	***Applications of Earthing & Bonding (cont'd)*** *Common Violations • Building Electrical Inspection Procedures • How to Recognise Hazards*
1100 – 1200	***Lightning*** *Need for a Lightning Protection System • Which Protection Systems Work and which Don't • Best Location for IT Equipment • Optimum Earthing for Building*
1200 – 1215	*Break*
1215 – 1420	***Lightning (cont'd)*** *Pitfalls of Isolated Earthing • Shielding and Bonding of Electronics and Communications • Optimum Location of Surge Protection Devices*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Surge & Transient Protection*** *Lightning Phenomena • Protection of Power Supply*
0930 – 0945	*Break*
0945 – 1100	***Surge & Transient Protection (cont'd)*** *Protection of Electric Communications Circuits • Power System Faults and Switching Surges*
1100 – 1200	***Surge & Transient Protection (cont'd)*** *Mitigation Techniques • Case Studies*
1200 – 1215	*Break*
1215 – 1345	***Power Conditioning*** *Power Conditioners • Uninterruptible Power Systems • Power Quality Alternative Sources*
1345 – 1400	***Summary, Course Conclusion, Open Forum & Closing***
1400 – 1415	***POST-TEST***
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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