

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

Course Title

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

Course Date/Venue

October 28-November 01, 2024/Gallery 5, Level 1, Concorde Hotel Kuala Lumpur, Malaysia

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

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

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

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\$ 8,800 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), 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)

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

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. Sydney Thoresson, PE, BSc, is a **Senior Electrical & Instrumentation Engineer** with over **40 years** of extensive experience within the **Power & Water Utilities** and Other **Energy Sectors**. His specialization highly evolves in **Electrical Safety, Power System Equipment, Electrical Faults, Electrical Drawing, Electrical Forecasting, Earthing & Noise Control, Transmission Networks, Substation, Distribution Networks, Substation Automation Systems & Application, Building Electrical Systems, Electrical System, HV/LV Electrical Authorisation, Variable Frequency Drives (VFD), HV/LV Equipment, Circuit Breaker, Motor Controllers, Hazardous Area Classification, Intrinsic Safety, Electrical Power Systems Quality & Troubleshooting, Protection & Relay, Electric & Control System Commissioning, Liquid & Gas Flowmetering, Fault Analysis in Electrical Networks & Distribution Cables, Custody Measurement, Ultrasonic Flowmetering, Loss Control, Gas Measurement, Process Control Instrumentation, Compressor Control & Protection, Control Systems, Programmable Logic Controllers (PLC), SCADA, Distributed Control Systems (DCS)** especially in **Honeywell DCS, H&B DCS, Modicon, Siemens, Telemecanique, Wonderware** and **Adroit**. Moreover, he has vast experience in the field of Safety Instrumented Systems (**SIS**), Safety Integrity Level (**SIL**), Emergency Shutdown (**ESD**), **Flowmetering & Custody Measurement, Multiphase Flowmetering, Measurement and Control, Mass Measuring System Batching (Philips)**, Arc Furnace Automation-Ferro Alloys, Walking Beam Furnace, Blast Furnace, Billet Casting Station, Cement Kiln Automation, Factory Automation and Quality Assurance Accreditation (**ISO 9000** and **Standard BS 5750**).

During Mr. Thoresson's career life, he has gained his thorough and practical experience through various challenging positions such as a **Project Manager, Contracts Manager, Managing Director, Technical Director, Divisional Manager, Plant Automation Engineer, Senior Consulting Engineer, Senior Systems Engineer, Consulting Engineer, Service Engineer** and **Section Leader** from several international companies such as **Philips, FEDMIS, AEG, DAVY International, BOSCH** Instrumentation and Control, **Billiton, Endress/Hauser, Petronet, Iscor, Spornet, Eskom** and **Afrox**.

Mr. Thoresson is a **Registered Professional Engineering Technologist** and has a **National Higher Diploma (NHD) & a National Diploma in Radio Engineering** from the **Witwatersrand Technikon**. Further, he is a **Certified Instructor/Trainer, a Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management (ILM)**, an active member of the **International Society of Automation (ISA)** and the **Society for Automation, Instrumentation, Measurement and Control (SAIMC)**.

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, 28th of October 2024

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: Tuesday, 29th of October 2024

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: Wednesday, 30th of October 2024

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) <i>Avoiding Non-Recommended Practices • Shielding</i>
1200 – 1215	<i>Break</i>
1215 – 1420	Electrical Faults <i>Ground Fault Circuit Interrupters • Equipment Ground Fault Protection Systems</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day Three</i>

Day 4: Thursday, 31st of October 2024

0730 – 0900	Applications of Earthing & Bonding <i>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</i>
0900 – 0915	<i>Break</i>
0915 – 1100	Applications of Earthing & Bonding (cont'd) <i>Common Violations • Building Electrical Inspection Procedures • How to Recognise Hazards</i>
1100 – 1200	Lightning <i>Need for a Lightning Protection System • Which Protection Systems Work and which Don't • Best Location for IT Equipment • Optimum Earthing for Building</i>
1200 – 1215	<i>Break</i>
1215 – 1420	Lightning (cont'd) <i>Pitfalls of Isolated Earthing • Shielding and Bonding of Electronics and Communications • Optimum Location of Surge Protection Devices</i>
1420 – 1430	Recap
1430	<i>Lunch & End of Day Four</i>

Day 5: Friday, 01st of November 2024

0730 – 0930	Surge & Transient Protection <i>Lightning Phenomena • Protection of Power Supply</i>
0930 – 0945	<i>Break</i>
0945 – 1100	Surge & Transient Protection (cont'd) <i>Protection of Electric Communications Circuits • Power System Faults and Switching Surges</i>
1100 – 1200	Surge & Transient Protection (cont'd) <i>Mitigation Techniques • Case Studies</i>
1200 – 1215	<i>Break</i>
1215 – 1345	Power Conditioning <i>Power Conditioners • Uninterruptible Power Systems • Power Quality Alternative Sources</i>
1345 – 1400	Summary, Course Conclusion, Open Forum & Closing
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-



Course Coordinator

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