ICTD

المركز العالمي للتدريب والتطوير

International Centre For Training & Development

EARTHING, BONDING, LIGHTING & SURGE PROTECTION

of Electrical & Electronic System and Equipment

H.H. Sheikh Sultan Tower (0) Floor | Corniche Street | Abu Dhabi – U.A.E | www.ictd.ae | ictd@ictd.ae

Course Introduction:

Few topics generate as much controversy and argument as that of grounding and the associated topics of surge protection, shielding and lightning protection of electrical and electronic systems. Poor grounding practice can be the cause of continual and intermittent difficult-to-diagnose problems in a facility. This workshop looks at these issues from a fresh yet practical perspective and enables you to reduce expensive downtime on your plant and equipment to a minimum by correct application of these principles. This workshop is designed to demystify the subject of grounding and presents the subject in a clear, straightforward manner. Installation, testing and inspection procedures for industrial and commercial power systems will be examined in detail. Essentially this course is broken down into grounding, shielding and surge protection for both power and electronics systems. Grounding and surge protection for Telecommunications and IT systems are examined in detail. Finally, the impact of lightning is examined and simple techniques for minimizing its impact are described.

Course Objectives:

Towards the end of the training, the participants 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 equipments and system. This includes electrical engineers, instrumentation engineers, control engineers, power protection engineers, designers, planners and other technical staff.

Course Outline:

DAY 1:

- ***PRE-TEST***
- **Introduction**
- **Introduction and Basics**

- Fundamentals of Earthing
- Bonding
- Lightning
- Surge Protection
- Shielding

- **Recommended Design and Installation Practices**
  - Wiring and Earthing for Safety and Performance
  - Wiring and Distribution Systems
  - Dedicated and Derived Neutral Systems
  - Earthing and Bonding Equipment

DAY 2:

- **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
  - Location of the Service Earthing Connection
  - Proper Sizing of Grounded (Neutral) Conductors
- **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
  - Equipment Earthing Conductor Types
  - Enclosure and Equipment Earthing
  - Earthing of Separately Derived Systems
  - Earthing at More than One Building
  - Disconnecting Means for Separate Buildings

DAY 3:

- **Earthing and Noise Control**
  - Misconceptions of Performance Earthing
  - Single Point versus Multi Point Techniques
  - Noise and Zero Signal Reference Grid
  - Avoiding Non Recommended Practices
  - Shielding
- **Electrical Faults**

- Ground Fault Circuit Interrupters
- Equipment Ground Fault Protection Systems

DAY 4:

- **Applications of Earthing and 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
  - Common Violations
  - Building Electrical Inspection Procedures
  - How to Recognise Hazards
- **Lightning**
  - Need for a Lightning Protection System
  - Which Protection Systems Work and which Don't
  - Best Location for IT Equipment
  - Optimum Earthing for Building
  - Pitfalls of Isolated Earthing
  - Shielding and Bonding of Electronics and Communications
  - Optimum Location of Surge Protection Devices

DAY 5:

- **Surge and Transient Protection**
  - Lightning Phenomena
  - Protection of Power Supply
  - Protection of Electric Communications Circuits
  - Power System Faults and Switching Surges
  - Mitigation Techniques
- **Power Conditioning**
  - Power Conditioners
  - Uninterruptible Power Systems
  - Power Quality Alternative Sources
- **Summary**, **Course Conclusion**, **Open Forum and Closing**
- ***POST-TEST***
- ***Presentation of Course Certificates***

Course Methodology:

A variety of methodologies will be used during the course that includes:

- (30%) Based on Case Studies
- (30%) Techniques
- (30%) Role Play
- (10%) Concepts
- Pre-test and Post-test
- Variety of Learning Methods
- Lectures
- Case Studies and Self Questionaires
- Group Work
- Discussion
- Presentation

Course Certificate:

International Center for Training & Development (ICTD) will award an internationally recognized certificate(s) for each delegate on completion of training.

Course Fees:

To be advised as per course locations. This rate includes participant's manual, Hand-Outs, buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Course Timings:

Daily Course Timings:

08:00 - 08:20	Morning Coffee / Tea
08:20 - 10:00	First Session
10:00 - 10:20	Coffee / Tea / Snacks
10:20 - 12:20	Second Session
12:20 - 13:30	Lunch Break & Prayer Break
13:30 - 15:00	Last Session