Content Community Connection

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30-Hour Industrial Electrical Grounding Training

Contact us Today for a FREE quotation to deliver this course at your company's location.

https://www.electricityforum.com/onsite-training-rfq

3 Great Courses: Basic Grounding And Bonding, HV Grounding, Grounding For Telecommunications Networks

This 5-Day Electrical Grounding Course encompasses three of our leading grounding and bonding courses:

Grounding and Bonding Training

High Voltage Electrical Grounding

Electrical Grounding for Telecommunications Networks

Our 12-Hour live online instructor-led basic industrial Grounding and Bonding course is founded on the Electrical Code and is designed to give students the correct information they need to design, install and maintain effective electrical grounding systems in industrial, commercial and institutional power systems.

Our 6-Hour live online instructor-led High Voltage Grounding course will provide the basic

principles of grounding a power supply network to ensure safety of personnel and equipment. Understanding these principles will provide the correct tools to design a grounding system applicable to utility networks and industrial plant distribution. This course covers the basic procedures in working safely on medium and high voltage systems.

Our 12-Hour live online instructor-led Electrical Grounding For Telecommunications Systems Training course based on the CE Code and NEC and is designed to give students the latest information on the design, installation and maintenance of electrical grounding systems in telecommunication networks.

Electrical grounding training subject matter can include:

- Advantages/Disadvantages Of Various Grounding Electrodes
- How To Properly Connect These Electrodes Into The Grounding System
- Types Of Bonds That Are Acceptable And Where To Use Them
- Resistance-To-Ground Testing
- Soil Resistivity Testing
- Basics Of Grounding System Design
- How Grounding Can Resolve Human Safety Issues In High-Voltage Environments
- The Impact Of Lightning Strikes On Grounding Systems
- The Basic Principles Of Grounding Of Medium And High Voltage Electrical Systems
- Protective Or Safety Grounding Systems
- Safe And Unsafe Working Conditions
- Design Considerations Of A Grounding Grid For Medium And High Voltage
- Measurement Of Ground Resistance, Resistivity In Substations
- Protection Of Substations From Lightning Strikes

WHO SHOULD ATTEND

- Utility And Industrial Electrical Engineers And Engineering Technicians
- Telecom Electrical Engineers And Engineering Technicians
- Project Engineers
- Design Engineers
- Field Technicians
- Electrical Technicians
- Electricians
- Plant Operators

- Plant Engineers
- Electrical Supervisors

STUDENTS RECEIVE

- **FREE** 100-Page Digital Electrical Grounding Handbook (Value $20)
- **$100 Coupon** Toward Any Future Electricity Forum Event (Restrictions Apply)
- 3.0 Continuing Education Unit (CEU) Credits
- **FREE** Magazine Subscription (Value $25.00)
- Course Materials In PDF Format

COURSE OUTLINE

30-Hour Industrial Electrical Grounding Training

Course Instructor

Pablo Diaz, P. Eng, *Electrical Grounding Consultant, The Electricity Forum*

Electrical Grounding and Bonding Training For Industrial, Commercial Institutional Power Systems Course Outline

DAY ONE

Course #1: Industrial Electrical Grounding and Bonding Training Program

SESSION 1: ELECTRICAL GROUNDING – OVERVIEW

SESSION 2: ELECTRICAL GROUNDING METHODS

SESSION 3: GROUNDING CONNECTIONS FOR SYSTEMS AND CIRCUITS

SESSION 4: GROUNDING OF GENERATOR TO SUPPLY EMERGENCY POWER

SESSION 5: GROUNDING CONNECTIONS FOR TWO OR MORE BUILDINGS OR STRUCTURES SUPPLIED FROM A SINGLE SERVICE

SESSION 6: CONDUCTOR TO BE GROUNDED FOR AC WIRING SYSTEMS

SESSION 7: CONDUCTOR ENCLOSURE BONDING

DAY TWO

SESSION 8: BONDING METHODS

SESSION 9: ELECTRICAL GROUNDING ELECTRODE SYSTEM

SESSION 10: GROUNDING AND BONDING CONDUCTORS

SESSION 11: GROUNDING AND BONDING CONDUCTOR CONNECTIONS

SESSION 12: GROUNDING AN ELECTRICAL DISTRIBUTION SYSTEM

SESSION 13: INDUSTRIAL PROCESSES CONTROL SYSTEMS GROUNDING

SESSION 14: ELECTRICAL GROUNDING IN HEALTH CARE FACILITIES

SESSION 15:

FOUR CASE HISTORIES INCLUDED:

THERE ARE FOUR CASE STUDIES THAT WILL BE PRESENTED: PETROCHEMICAL, TELECOMMUNICATION, COMPUTER FACILITY, AND A MANUFACTURING PLANT. SECOND DAY ALSO INCLUDES A LABORATORY SECTION WHERE A THE PARTICIPANTS ARE TAUGHT HOW TO PERFORM A GROUNDING AND POWER QUALITY SITE SURVEY. MEASURMENT PERFORMED: GROUND RESISTANCE AND RESISTIVITY, POWER QUALITY PARAMETERS SUCH AS: VOLTAGE, CURRENT, LOAD BALANCE, POWER FACTOR, DISPLACEMENT POWER FACTOR, VOLTAGE AND CURRENT HARMONICS, EFFECTIVE POWER (KW), APPARENT POWER (KVA), REACTIVE POWER (KVAR), K FACTOR FOR TRANSFORMERS, ETC, TO DIAGNOSE AND SOLVE MOST COMMON PROBLEMS.

DAY THREE

High Voltage Grounding Training Course Outline

Course #2: High Voltage Electrical Grounding and Bonding For Utility and Industrial Applications

SUBSTATION GROUNDING DESIGN

SESSION 1: DEFINITIONS AND INTERPRETATIONS

SESSION 2: GROUNDING OPTIONS

SESSION 3: GROUND GRID DESIGN FOR SUBSTATIONS

SESSION 4: SWITCHYARD AND SUBSTATION PROTECTIVE GROUNDING

SESSION 5: POWER LINE PROTECTIVE GROUNDING

SESSION 6: TECHNICAL CONSIDERATIONS IN PROTECTIVE GROUNDING IN SUBSTATIONS AND SWITCHYARDS

INTERNATIONAL AND LOCAL REGULATIONS

DAY FOUR

Electrical Grounding For Telecommunications Systems Course Outline

OVERVIEW

- Grounding Concepts For The Telecommunications Industry
- How The Telecommunications Industry Developed The Concept Of "Single Point Ground" System
- Utilization Of Banks Of Batteries And Their Grounding In A Telecommunication Site
- How To Ground Telecommunications Towers.
- How To Ground Equipment And Communications Antennas Installed On A Communications Tower
- Proper Ground Resistance Values Required By The Telecommunications Industry
- The Most Common Grounding Electrodes Utilized In A Telecommunications Site
- Proper Grounding And Bonding Of Equipment Installed In A Telecommunications Rack.
- The "Master Ground Bar' And Other Auxiliary Copper Bars Used In The Telecommunications Industry And Their Proper Grounding.
- Review Of Four Case Histories Performed In Cellular And Digital Microwave Sites

SESSION 1: TELECOMMUNICATIONS GROUNDING OVERVIEW

- Grounding- Definitions
- Grounding Methods Used In The Telecommunications Industry
- Grounding Practices For Cellular And Digital Microwave Sites
- System Grounding For Transformers Used In A Communications Site
- Telecommunications Single Point Grounding
- Why The Telecommunications Industry Uses A Solid Grounding System
- Impedance Grounding For A Telecommunication Tower
- Why Ground Circuits And Systems
- Grounding Systems Options For A Telecommunications Site
- Grounded Systems
- The Telecommunications Industry TIA/EIA Cabling Grounding

SESSION 2: GROUNDING ELECTRODE SYSTEM

- Grounding Electrodes: Construction And Installation
- Ground Resistance And Resistivity
- Grounding Electrode Conductor
- Electrical Grounding And Corrosion
- Materials-Splicing
- Installation And Protection
- Sizing The Grounding Electrode Conductor

SESSION 3: SYSTEM GROUNDING

- Circuit Grounding
- Why Systems And Circuits Are Grounded
- Grounded Conductor
- Direct Current Systems
- Alternating-Current System
- Systems Less Than 50 Volts

- Grounding Of Transformers
- Grounding For Telecommunications Site

SESSION 4: TOWER INSTALLATIONS

- Self-Supporting Tower Installations
- Bonding The Tower Ground To The Central Office Ground
- Pole Mounted Antennas
- Antenna Towers Mounted On Top Of Buildings
- Antennas And Connecting Coaxial Transmission Lines And Waveguides
- Protection Of Radio Equipment
- Guyed Tower Installation
- Pole Mounted Installation
- Building Mounted Installation

SESSION 5: TELECOMMUNICATIONS ELECTRICAL BONDING SYSTEM

- Equipment Bonding And Grounding
- Rack Bonding
- Major Requirements: Leakage Current, Proper Sizing
- Generators
- Transformers
- UPS Systems: Online, Standby, Line Interactive, Alternative
- Installation
- Sizing The Equipment Grounding
- Identification Of The Equipment Grounding Conductor
- Electric Shock
- Grounding And Electric Shock

SESSION 6: TELECOMMUNICATIONS STAND-BY/EMERGENCY GENERATORS

- Separately Derived Systems (SDS)
- When An Emergency Generator Is Not A SDS
- Main Bonding Jumper
- Portable Generators
- Vehicle Mounted Generators

DAY TWO

SESSION 7: LIGHTNING PROTECTION SYSTEM FOR A TELECOMMUNICATIONS SITE

- The Phenomenon Of Lightning
- Development Of Lightning Flash
- Flash Parameters
- Lightning- Characteristics
- Electrical Effects
- Basic Protection Requirements
- Protection Systems
- Electro-Geometric Method
- Tower Lightning Protection System
- Rolling Sphere Concept
- Lightning Protection System Specifications

SESSION 8: TELECOMMUNICATIONS INDUSTRY GROUNDING PRACTICES

- Telecommunication Site Grounding
- Single Point Ground System
- Grounding Subsystems
- Exterior Ground Ring
- Exterior Structural Metal Elements
- Interior Ground Ring- Halo Ground

- Master Ground Bar
- Cable Entrance Ground Bar
- Telecommunications Closets
- Cable Trays Or Raceways
- Low Frequency Networks
- High Frequency Networks
- Waveguides Grounding
- Racks, Cabinets And Enclosures
- Central Office Battery System

SESSION 9: GROUNDING AGAINST ELECTROMAGNETIC INTERFERENCE (EMI/ESD/RFI)

- Electronic Equipment Grounding
- Introduction And Definitions
- Telecommunication Rooms And Closets
- Data Processing Equipment Grounding
- Electronic Security Equipment Grounding
- EMI (Electromagnetic Interference)
- Inductive, Capacitive And Radiation Coupling
- RFI (Radio Frequency Interference)
- Electrostatic Discharge
- Shields Grounding
- Cable Shielding And Grounding
- Coaxial Cables
- Telephone Lines

SESSION 10: TELECOMMUNICATIONS EQUIPMENT PROTECTION

- System Reference Zero
- Detection Of A Faulty Neutral-Ground System
- Sizing Wiring To Meet Computer Industry Standards
- Grounding Line Treatment Devices

- Transient Overvoltage Protector Grounding
- Gas Tubes
- Metal Oxide Varistors
- Silicon Avalanche Diodes
- Data Lines Grounding- RS232

CASE HISTORIES 4 case histories included: Four Telecommunications Case Histories will be reviewed and analyzed.

STANDARDS AND CODES REFERNCES FOR THIS COURSE

- National Electrical Code/IEEE Standards/ANSI Stds, Industry STDS
- Canadian Standards Association:
- CSA Grounding And Bonding (C22.1 E98, Section 10)
- CSA Protection And Control (C22.1 E98, Section 14)
- CSA Installation Of Electrical Equipment (C22.1 E98, Section 26)
- CSA Electrical Communication Equipment (C22.1 E98, Section 60)
- Canadian Electrical Code:
- Bonding And Grounding Of Electrical Equipment (C22.2 No. 0.4 EM1982 R1993)
- Grounding And Bonding Equipment (C22.2 No. 41 EM1987 R1993) (C22.2 No. 0.4 EM1982 R1993)
- NEC National Electrical Code

REFERENCES

- Communications:
- TIA/EIA - 568: Commercial Building Telecommunications Cabling Standard
- TIA/EIA - 607: Commercial Building Grounding And Bonding Requirements For Telecommunications
- ISO/IEC IS 11801: Generic Cabling For Customer Premises
- BICSI: BICSI Telecommunications Cabling Installation Manual

- BICSI: BICSI Customer-Owned Outside Plant Design Manual (CO-OSP)

Review of expectations
Questions and Answers

COURSE TIMETABLE

All days:
Start: 10 am ET
Finish: 4:30 pm ET