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## Tower Grounding Training For Telecommunications Networks

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

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

The Electrical Grounding For Telecommunications Applications course that will define and completely explain grounding and bonding for telecommunications systems.

It will provide information for the installation of a grounding and bonding system for communications infrastructure. The course will include requirements for providing a permanent grounding and bonding infrastructure for communications circuits, raceways, and cable tray.

This course will provide the participants with a good understanding of the principles of lightning protection and grounding of telecommunications facilities, such as self-supporting radio towers, guyed masts, monopoles and rooftop antenna mounting frames and structures and how techniques are applied in the field to protect these structures and the associated equipment, staff and the general public.

This training course will explain grounding and bonding requirements in the C22.1-06, the

NEC and TIA/EIA/ANSI Standards.

## **COURSE BENEFITS**

Improve the protection and operation of your communications facilities and minimize the hazards to your personnel. This course will address electrical and mechanical grounding in central offices, loop access sites like DLCs, buildings, and wireless communications installations such as base station sites and microwave radio installations.

### **Students will come away with a sound understanding of:**

- The fundamental characteristics of lightning and how to protect against it
- How power line disturbances can impact communications
- How to control corrosion through grounding
- The role of the CE Code, NESC, NEC and other codes and standards
- Earth grounds and soil characteristics
- How to provide for a common bonding network in telco sites and buildings
- The participants will understand the requirements of the CEC, NEC and TIA/EIA/ANSI “Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications.
- The participant will understand the concept of "equal potential grounds" that the industry tries to achieve in a data center telecommunications environment.
- Proper grounding at radio and antenna sites

## **WHO SHOULD ATTEND**

- 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)
- 1.4 Continuing Education Unit (CEU) Credits
- **FREE** Magazine Subscription (Value \$25.00)
- Course Materials In Paper Format

### **COURSE OUTLINE**

#### **Electrical Grounding and Bonding For Telecommunications Networks**

#### **Instructor**

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

#### **DAY ONE**

#### **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**

### **Both Days:**

Start: 8:00 a.m.

Coffee Break: 10:00 a.m.

Lunch: 12:00 noon

Restart: 1:15 p.m.

Finish: 4:30 p.m.

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