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## Lightning Protection Systems Training

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

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

Lightning damage to equipment results in losses exceeding twenty-six billion dollars annually in North America, and nearly three times that worldwide with more than 150 strikes per second. Insurance payout resulting from lightning damage, accounts for approximately 6.5 per cent of all industrial, commercial and institutional property and casualty claims. Ironically, lightning damage to equipment can be all but totally prevented.

Special lightning protection systems prevent damage and are simple, very reliable, and inexpensive, particularly when compared to the cost of equipment repair and replacement, as well as the possible consequences of harm to personnel. However, methods for lightning special protection cannot be found in the code books, i.e.; National Electrical Code (NEC).

In less than 20 years, cellular mobile towers have proliferated on every continent, and are perfect lightning targets! To a lesser extent, AM, FM, and TV towers have also sprouted, sometimes sharing with cell systems. Not only are the towers at lightning risk, but also the cellular, broadcast, and communications antennas mounted on them. At risk too, are the attached cell site equipment, radio transmitters, coaxial cables, and tower light systems.

This Lightning Protection Systems Training course provides a general review of protection schemes and their impact on various industries. Strategies for mitigating damage and improving overall equipment performance are discussed.

**After Attending, You Will Understand:**

- Lightning protection grounded towers, wireless facilities, wind power structures, and industrial structures and equipment
- Divide and control lightning strike energy
- Tower location in respect to equipment building, electromagnetic radiation, need for Faraday Cage
- Coordinate the coax cable entry with building equipment grounding
- Voltage divider circuit from lightning traveling down a tower
- Lightning - A major source of Ground Potential Rise (GPR)
- Bulkhead or wave guide hatch
- Single point grounding location
- Isolate wire-line communications from remote ground
- AC power surge protection and UPS at the power entrance facility
- Standard telephone pair protection is worthless in a Ground Potential Rise

**WHO SHOULD ATTEND**

This lightning protection course is designed for those who are required to design, plan, install, maintain and/or supervise contractors who are providing grounding and lightning protection systems, such as: Electrical Engineers, Project Engineers, Design Engineers, site Engineers or those who are responsible for the engineering, design, construction, installation, inspection, operation, or maintenance of lightning protection grounding systems.

**STUDENTS RECEIVE**

- **FREE** Electricity Forum 120-Page Digital Power Quality Handbook (Value \$20.00)
- **\$100 Coupon** Toward Any Future Electricity Forum Event (Restrictions Apply)
- 1.4 Continuing Education Unit (CEU) Credits
- **FREE** Magazine Subscription (Value \$20.00)
- Course Materials In Paper Format

## **COURSE OUTLINE**

### **DAY ONE**

#### **Session 1: Lightning Protection Systems Fundamentals**

- Nature of Lightning
- Lenz Law
- Principles of Lightning Protection
- Terminology
- Requirements for Good Protection
- Explanation of Bonding Principles
- Isokeraunic Map of Canada
- Canada's Mean Annual Lightning Strike Density

#### **Session 2: System Components**

- Air Terminals location, size and materials
- Minimum requirements for roof and down conductors
- Connectors and Fittings.
- Roof Conductors
- Down Conductors
- Cross-Run Conductors

- Conductor Bends.
- Quantity of Down Conductors.
- Grounding Conductors

### **Session 3: Installation of Lightning Protection Systems**

- Protection for Ordinary Structures
- Practices for Lightning Protection
- Zones of Protection
- Rolling Sphere Model.
- Zone of Protection Utilizing Geometric Model.
- Separately Mounted protection System
- Overhead Ground Wire Protection
- Lightning Protection for Structures Containing Hazardous Materials
- Flammable Vapors, Flammable Gases, or Liquids that can give off flammable vapors
- Metallic Tanks Protection
- Tanks and Tank Farms
- Equipment on the sides of very high masts, such as television or FM antennas
- Waveguide installation and grounding
- Power Stations and Substations Surge Arresters
- Lightning Counters

### **Session 4: Transient Overvoltage Protection**

- Transient Overvoltage Generated by Lightning
- Transient surges Produced by Energizing & De-energizing of Electrical Loads
- Transient Amplitudes from Direct Strikes
- Induced Transient Amplitudes
- Transient Waveforms
- Frequency of Transient Occurrence
- Transient Protection Standards

- Surge Protection Requirements. (IEEE C62.41)
- Surge Threat Levels.
- IEEE Location Categories
- Equipment Withstand Levels
- Information Technology Industry (ITI)/CBEMA Curve
- Effects of Transient Overvoltage
- Transient Source and Equipment Damage
- Susceptibility of Components and circuits
- Surge Suppression Technologies
- Gas Tube, Silicon Avalanche Diode (SAD), Metal Oxide Varistor (MOV)
- Operating Characteristics of Surge Suppressors
- Transient Dissipation Capability of Surge Suppressors
- Selection Criteria for Surge Suppressors
- Installation Criteria
- Electrical Power Circuits, Signal, Data, and Communication Protection.
- Facility AC Surge Protection.
- Signal, Data, and Communications Surge Protection (RF Protection).
- Operating Characteristics of Surge Suppressors
- Surge Protection Installation
- Transient Suppression for RF Coaxial Lines

## **DAY TWO**

### **Session 5: Electrostatic Discharge Protection**

- Fundamental Causes of Static Charges
- Conditions Affecting the production of static charges
- Magnitude of static Charges
- Range of static voltages produced by various processes
- Primary Sources of Component Damage
- Mitigating static charges
- Methods of static control

- Electrical energy ignition of some dusts
- Measurement and detection of static charges

### **Session 6: Lightning Protection and Grounding Solutions for Wireless Networks**

- Overview of Lightning event and its statistical parameters
- Grounding and bonding fundamentals for Wireless Networks
- Overview of Lightning Protection technologies
- Industry standards governing protection devices compliance

### **Session 7: Grounding for Lightning, Transient Overvoltage and Static Protection**

- Grounding Practices for Lightning Protection
- Single Point Grounding System
- Grounding Electrodes
- Electrodes with Large Conductive Surface
- Lower Surge Impedance Grounding Systems
- Lower Ground Resistance Grounding Systems
- The need for Artificial soils and Quality electrodes
- Ground Ring & Radials complemented with artificial soils.
- Static Protection Grounding
- Grounding for Transient Suppression
- Grounding Methods for Overhead ground-wire
- Cathodic protection Methods
- Inspection and Maintenance of Lightning Protection Systems

### **Session 8: Workshop -- Lightning Protection System Review**

- A practical workshop where the participant will design a lightning protection system for a structure, working through all the necessary steps from risk assessment to inspection, testing and certification.

**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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