



# Building Electrical Systems Training

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## COURSE DATES AND TIMES

Building Electrical Systems - Our 12-Hour live online instructor-led training course addresses all typical electrical power systems existing in buildings from the input service supply to the more complex protection and control systems required in order to achieve maximum performance.

This Building Electrical Systems course teaches how various subsystems interact through coordination, in order to maintain optimal performance.

Our Integrated Building Electrical Systems training course is designed to assist organizations to identify opportunities for retrofitting existing commercial buildings or how to design Integrated Building Electrical Systems technology into new building engineering designs.

With the rapid integration of various elements of Building Electrical Systems, it is important to design, build and maintain Building Electrical Systems as an overall connected system, as opposed to sets of individual subsystems. Building Electrical Systems include: Utility and building Generation power input sources, UPS, Electrical Protection, Power Quality, Electrical Grounding, Energy Management, Fire Safety, Communications, Vehicle Charging, Building Automation, etc.

This course teaches how these various higher power subsystems integrate and work together to form a robust, properly coordinated and functioning single phase electrical energy power systems.

This real-world-based Integrated Building Electrical Systems Training course will give you a broad introduction to the specific issues involved with Building Automation Systems (BAS).

Learn about sensing and measurement, actuation, analog output devices, and relays.

This Integrated Building Electrical Systems training course will enable you to identify and describe the major components in an Integrated Building Electrical Systems along with the basic mechanical components and controls.

## LEARNING OBJECTIVES

- Understand The Function Of Each Subsystem Of The Electrical; Fire Protection Or Electro-Mechanical Subsystem Of A Large Building
- Be Able To Size And Select The Proper Electrical Subsystems For A Building, Whether Single Phase Or Three Phase
- Understand The Interaction Between The Major Electrical Subsystems Of The Building, (E.G. Electrical; Building Automation System; Fire Protection)
- Write Maintenance Procedures For The Major Electrical Subsystems Of The Building
- Perform Maintenance On Major Building Electrical Equipment
- Select Optimum Settings For The Major Electrical Equipment

## WHO SHOULD ATTEND

- Industrial, Commercial, Institutional Electrical Engineers
- Consulting Electrical Engineers
- Electrical Maintenance Tradespeople & Technicians
- Instrumentation And Control Engineers
- Power System Protection And Control Engineers
- Building Service Designers
- Data Systems Planners And Managers
- Other Electrical Personnel Involved In The Maintenance Industrial, Commercial And Institutional Power Systems.

## STUDENTS RECEIVE

- 100-Page Electrical Maintenance Handbook - Value \$20 (details below)
- 1.4 Continuing Education Unit (CEU) Credits
- A **FREE** Magazine Subscription (Value \$50)
- **\$100** Coupon toward any future Electricity Forum event (restrictions apply)
- Course Materials in Paper Format

## COURSE OUTLINE

### **Building Electrical Systems Training Course Outline**

#### **DAY ONE**

##### **1. ENGINEERING AND MAINTENANCE CONSIDERATIONS**

- Introduction To The Building Subsystems
- Design Consideration For Electrical And Mechanical Engineers
  - Green field vs retrofit considerations
  - Base building vs Tenant Fit-out considerations
- Maintenance Requirements For The Electrical Building Systems
  - Preventative Maintenance provisions
    - 3rd party Vendor vs in house resources
    - Basic CMMS (Computer Maintenance Management Software) concepts
  - Scheduled maintenance vs System overhaul under capital expenditure, intro to ROI considerations
- Fire Protection Regulations & Testing Requirements

## **2. POWER INPUT SERVICE**

- Building Electrical Power Requirement
- Modeling Of Building Electrical Systems
- Building Power Feeders
- Feeder Protection And Protection Coordination Of The Upstream Power
- Voltage Protection, Surge Arrestors
- Building Grounding Systems
- Potential Drop Testing
- Power Cable Installation And Testing
  - Meggar, Hi Pot testing
- Cable Tray Systems

## **3. DISTRIBUTION AND ELECTRICAL PANELS AND MCCs**

- Typical Electrical Distribution System For A Building
- Selection Of The Major Equipment
- Example Of Writing Technical Specification For Major Electrical Equipment
- Meters And Instrumentation Required For Building Electrical Service
- Equipment Duty, And Short Circuit Rating
- Metal Clad Versus Metal Enclosed Switchgear
- Molded Case Versus Low Voltage Circuit Breakers
- Proper Specification Of Circuit Breakers
- ARC Flash Calculations, CSA Z462 Requirements

## **4. TRANSFORMERS**

- Building Transformer Feeder, Typical Configuration, Y-Y; D-Y; Y-D
- Dry Versus Oil Cooled Transformer
- Integrated Switchgear Transformer
- Electrical Room Ventilation Requirements
- Electrical Room Fire Protection Requirement, Options And Debate
- Testing And Maintenance Requirements Of The Transformers
- How To Avoid Ground Loops

## **5. AUTOMATIC TRANSFER SWITCHES (ATS)**

- Automatic Transfer Switch Sizing Requirements
- Types Of ATS, Make Before Brake; Brake Before Make
- Three Pole And Four Pole ATS
- Switching neutral for separately derived power systems
- How To Select The Proper ATS Type
- Testing And Maintenance Requirements For The ATS
- Programming The ATS
- Contactor Versus Breaker ATS, Advantages And Disadvantages
- When To Use The Bypass Breakers

## **6. BACKUP GENERATION**

- Sizing The Backup Generator For An Application
- Installation Requirements Of The Backup Generators
- Ventilation And Emission Requirements
- Testing The Backup Generator, CSA 242-09
- Power Factor Correction For Large Facility

## **7. UNINTERRUPTIBLE POWER SUPPLY (UPS)**

- Selecting The Proper UPS For The Application
- UPS Protection System
- Typical Structure Of The Inline UPS
- Resonant Versus PWM UPS
- Off-Line UPS Applications
- UPS Feed From Backup Generator
- Programming And Remote Monitoring Of The UPS System
- Maintenance Requirements For UPS Systems
- Battery Replacement And Testing
- UPS Grounding Requirements

## **8. LIGHTNING PROTECTION**

- Typical Lightning Protection System For A Building
- Selecting The UL Certified Components For Lightning System
- Special Requirements, Case Study: Roof Top Unit And High Voltage Lines

## **9. BUILDING GROUNDING SYSTEMS**

- Building Grounding System
  - Solidly grounded systems
  - Impedance grounded systems
  - Bonding
- Grounding System Interconnection
- Testing Requirements Of The Grounding System

- Maintenance Of The Building Grounding System
- Protection Coordination And Grounding Study Example

## **10. FIRE PROTECTION SYSTEMS**

- Fire Protection Requirements For Specific Buildings
- Zoning Of The Fire Protection System
- Fire Detection Systems
- Fire Suppression Systems
- Programming And Installation Requirements Of The Fire Systems
- Testing Of The Building Fire System
- Local And Remote Annunciation Panels
- Interaction Between Backup Generator And Fire System
- Example Of A Design Of A Building Fire System
- Applicable regs:
  - CAN-ULC-S537-13 VERIFICATION
  - CAN-ULC-S524-2014 STANDARD FOR FIRE ALARM INSTALLATION
  - NFPA 70

## **11. SECURITY SYSTEMS**

- Security Systems For Buildings
- Security System DVR Off site integration
- Interaction Between Fire System And Security System
- Accommodating Special Need Individuals
- Programming And Maintenance Of The Security System

## **12. BUILDING AUTOMATION SYSTEMS**

- Building Automation Main Functions
- Basics of BACnet protocol
- Controlling The AIR Quality
- Optimum Usage Of The Equipment
- Heating System Control
- Cooling System Control
- Saving Energy
- Water Quality Control, New Water PH Control Systems
- Monitoring CO Release
- Testing And Maintenance Of The BAS
- Motor Control Centers Versus Panelboards
- Use of Integral VFD's on pumps
- Using VFD And Soft-Starters
- VECTOR And DIRECT Torque Control Units
- Energy Recovery Via VFD
- Power Factor Correction Via VFD

## **13. ENERGY MANAGEMENT SYSTEMS**

- Building Energy Management Principles
- Taking Advantage Of The Natural Energy
- Building Orientation And Windows Selection Solar gain
- Energy Saving And Energy Storage For Buildings

## **14. BUILDING ILLUMINATION SYSTEMS**

- Natural Illumination
- Typical Electrical Panels For Lighting
- EMI And Filters Required For New LED Lighting
- Lighting Automatic Control Systems, Autonomous & networked
- Maintenance And Testing Of The Lighting System
- Emergency Lighting System Requirement
- Lighting audit and IES modelling

## **15. GREEN BUILDING REQUIREMENTS**

- New Trends In Energy Saving
- Energy Compliant Buildings
- Waste Management Requirements

## **COURSE TIMETABLE**

**Both days:**

Start: 10 am ET

Finish: 4:30 pm ET

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

[Request Quote](#)