Hands-On

Bonding and Grounding Electrical Utilities

Course Description

Our 2-day Hands-On Electrical Grounding and Bonding course highlights one of the most important but least understood articles in the National Electric Code - Grounding and Bonding. Simply put, proper grounding and bonding protects your employees from electric shock and your plant and equipment from heat and fire by limiting the voltage imposed by lightning, line surges, or unintentional contact with higher-voltage lines as well as a ground-fault (phase-to-ground fault).

Article 250 of the National Electric Code identifies grounding and bonding system installation methods. A properly installed grounding or bonding system for shielding, EMI, static and lightning protection can help prevent cable failures, equipment damage and power quality problems. These systems are also important for personnel protection and compliance with OSHA 1910.301-.308, and .331-.335.

This course takes a deep dive into this topic and is aimed at reducing those risks. Additionally, proper grounding of equipment will also help answer any power quality issues you may be experiencing and prepare your technicians how to insure that the proper procedures and practices and followed but most importantly understood!

BTS can also incorporate your specific equipment into this training to make it more impactful for your employees.

Students Will Learn

- **Interpret applicable NEC article 100 and 250 definitions**
- **Identify safety hazards created by ineffective grounding systems**
- **Identify common types of grounding electrodes**
- **Explain the purpose of impedance or resistance ground-fault detection systems**
- **Explain equipment utilization for grounding and bonding systems**
- **Describe grounding and bonding requirements for electrical panels on the load side of the service disconnecting means**
- **Describe the requirements for use of an isolated grounding system**
- **Perform earth resistivity tests and interpret results**
- **Perform fall-of-potential earth resistance test and interpret results**
- **Understanding the Bonding and Grounding for i.e. Breakers, Relays, Transformers, etc.**
- **And More...**

Target Audience

This course is intended for technicians, electricians, engineers and inspectors responsible for the installation, maintenance, troubleshooting and repair of grounding and bonding systems.

Prerequisites

Basic knowledge of Electricity.

Course Outline

Module I: Introduction

- Purpose of Grounding
- Understanding Accepted Definitions
- Review of Electricity Basics
- Electrical Shock & Hazards
- Ground Fault Protection, GFCI / GFPE

Module II: Grounding & Bonding Foundations

- NEC Articles
- General Requirements
- Objectionable Current
- Connection of Equipment
- Clean Surfaces

Module III: System Grounding

- A/C Circuits 50 to 1000 Volts
- Circuits not to be Grounded
- Grounding Service Supplied A/C Systems
- Main Bonding Jumper & System Bonding Jumper
- Feeders & Branch Circuits

Module IV: Grounding Electrode System & Grounding Electrode Conductor

- Grounding Electrodes
- System Installation
- Methods

Module V: Enclosures, Raceways and Service Cable Connections

Module VI: Bonding

- Services
- Other Systems
- Other Enclosures
- Hazardous Locations
- Equipment Bonding Jumpers
- Piping Systems and Exposed Structural Steel
- Lighting Protection Systems
- Other

Module VII: Equipment Grounding and Equipment Grounding Conductors

- Permanent Wiring Methods
- Types of Conductors
- Identification of Conductors
- Installation
- Sizing

Module VIII: Methods of Equipment Grounding

- Connections
- Fastened in Place or Permanent Wiring
- Considered Effectively Grounded
- Grounded Circuit Conductors
- Boxes and Receptacles

Module IX: Specific Equipment/Situations

Module X: Fundamentals of Equipment-Grounding Circuit Design (Upon Request**)**

Delivery Method

Instructor-Led with numerous Hands-On labs and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

2 Days