Training Program:

Understanding Low Voltage Electrical Systems

Introduction:

This five-day program is used regularly by industrial plants and industries utilizing cross-training to increase productivity, effectiveness and flexibility in their workforce. It also provides an excellent foundation in electrical maintenance and troubleshooting for workers entering apprenticeship programs, leapfrogging them several years ahead in their knowledge, skills and abilities.

The successful student will receive a solid understanding of low voltage single and three phase electrical systems. The program places maximum emphasis on safe work practices and procedures, installation requirements, troubleshooting and preventive maintenance. This program saved one client a year of OJT with increases in safety, quality and productivity.

CSA Z462 and NFPA 70E require that non-electrical supervisors managing electrical crews be qualified to understand the safety, installation, maintenance and troubleshooting tasks that electrical workers perform daily. It includes a complete understanding of the requirements of CSA Z462 and NFPA 70E.

Who Should Attend?

Millwrights, mechanics, and other trades whose jobs require a certain amount of cross training in industrial electrical systems as they work with their electrical counterparts as well as non-electrical supervisors who must know what their electrical subordinates are exposed to.

Course Objectives:

After attending the training, you will be able to:

- Understand how to conduct basic measurements in an electrical circuit or system using a multimeter.
- Understand how to test electrical components and circuits using a DMM.
- Explain the basic principles of electricity and how circuits operate.
- Understand how to troubleshoot electrical circuit and system faults.
- Inspect and evaluate the construction and operation of electrical circuits.
- Understand how to replace single phase electrical equipment following proper methods, techniques and applicable regulations.
- Recognize the damage electricity can cause to the human body, identify common causes and follow safe work practices and procedures.
- Understand how to test, troubleshoot and diagnose single phase electrical circuit problems following proper methods and techniques.
- Understand the systems that protect people, equipment, materials and the environment.
- Understand how to test circuit safety, control and magnetic devices.
- Understand how to replace three phase electrical equipment following proper methods, techniques and applicable regulations.
- Understand how to test, troubleshoot and diagnose three phase electrical circuit problems following proper methods and techniques.

Course Outline

I. TEST ELECTRICAL CIRCUITS

Objective: Understand how to conduct basic measurements in an electrical circuit or system using a multimeter.

- Use Digital Multimeters
- Measure Voltage
- Measure Current
- Measure Power
- Evaluate Students

II. TEST ELECTRICAL COMPONENTS

Objective: Understand how to test electrical components and circuits using a DMM.

- Test Conductors
- Measure Circuit Resistance
- Test Insulation
- Evaluate Students

III. APPLY ELECTRICAL FUNDAMENTALS

Objective: Explain the basic principles of electricity and how circuits operate.

- Apply Ohms Law
- Apply Watts Law
- Apply Direct Current Theory

- Apply Alternating Current Theory
- Troubleshoot Electrical Circuits
- Evaluate Students

IV. TROUBLESHOOT ELECTRICAL FAULTS

Objective: Understand how to troubleshoot electrical circuit and system faults.

- Identify System Problems
- Identify Maintenance Problems
- Identify Operating Problems
- Troubleshoot Circuit Problems
- Evaluate Students

V. OPERATE ELECTRICAL SYSTEMS

Objective: Inspect and evaluate the construction and operation of electrical circuits.

- Read Electrical Diagrams
- Identify Color Coding
- Plan Circuit Device Installations
- Inspect 120 Volt Circuit Installations
- Plan 120/240 Volt Circuit Installations
- Evaluate Transformer Applications
- Compare Three Phase Systems

- Evaluate Students

VI. REPLACE SINGLE PHASE EQUIPMENT

Objective: Understand how to replace single phase electrical equipment following proper methods, techniques and applicable regulations.

- Inspect Circuit Simulator Boards
- Connect Wires
- Connect Cables
- Connect Cord Ends
- Connect Lights
- Connect Receptacles
- Connect Single Phase Motors
- Connect Single Phase Panels
- Evaluate Students

VII. ARC FLASH AND LOW VOLTAGE SAFETY

Objective: Recognize the damage electricity can cause to the human body, identify common causes and follow safe work practices and procedures.

- Intro to the CSA Z462 standard.
- Avoid Electric Shocks.
- Avoid Arc Flash Hazards
- Select appropriate PPE

- Use Rubber Gloves Effectively.
- Isolate Circuits and Test Dead
- Safe Switching Methods

VIII. TROUBLESHOOT SINGLE PHASE SYSTEMS

Objective: Understand how to test, troubleshoot and diagnose single phase electrical circuit problems following proper methods and techniques.

- Troubleshoot Open Circuits
- Troubleshoot Short Circuits
- Evaluate Students

IX. MAINTAIN PROTECTIVE SYSTEMS

Objective: Understand the systems that protect people, equipment, materials and the environment.

- Describe Power Company Grounding
- Ground Electrical Systems
- Bond Electrical Equipment
- Ground Electrical Equipment
- Maintain Double Insulation
- Test Fuses
- Test Breakers
- Evaluate Students

X. TEST CIRCUIT SAFETY AND CONTROL DEVICES

Objective: Understand how to test circuit safety, control and magnetic devices.

- Test Magnetic Devices
- Test Safety Devices
- Test Control Devices
- Evaluate Students

XI. REPLACE THREE PHASE EQUIPMENT

Objective: Understand how to replace three phase electrical equipment following proper methods, techniques and applicable regulations.

- Mount System Simulator Boards
- Connect Three Phase Panel Boards
- Connect Three Phase Cables
- Connect Three Phase Manual Starters
- Connect Three Phase AC Motors
- Identify Three Phase Motor Failures
- Connect Three Phase Magnetic Starters
- Protect Three Phase Motors
- Evaluate Students

XII. TROUBLESHOOT THREE PHASE SYSTEMS

Objective: Understand how to test, troubleshoot and diagnose three phase electrical circuit problems following proper methods and techniques.

- Troubleshoot Power Circuit Faults
- Troubleshoot Control Circuit Faults
- Evaluate Students

Accreditation:

BTS attendance certificate will be issued to all attendees completing a minimum of 80% of the total course duration.