

Electrical Safety and Protection

Course 205.1: Electrical Safety and Protection

Examines electrical hazards and stresses the importance of electrical safety. Covers the equipment and procedures necessary to work safely with electricity, including PPE, lockout/tagout, and first aid. Explains the importance of grounding. Describes many kinds of fuses, circuit breakers, and motor protection devices and their uses.

TPC Training is accredited by IACET to offer **0.7 CEU** for this program.



Lesson 1: Electrical Hazards

Topics

The Importance of Electrical Safety; The Electric Circuit; Electric Shock; Electric Arc; Basic Rules of Electrical Safety; Hazardous Electrical Locations; Additional Hazards

Objectives

- List the three main factors that determine the effect of electric current on the human body.
- Explain what to do if a person is a victim of electric shock.
- Name four precautions you can take to guard against electric shock.
- Define the term qualified person.
- Summarize the basic rules of electrical safety.

Lesson 2: Electrical Safety Equipment

Topics

Work Clothes; Personal Protective Equipment; Special Body Protection; Foot Protection; Gloves; Head Protection; Eye Protection; Face Protection; Safety Harnesses and Lifelines; Respiratory Protection; Lockout Devices; Barricade Tape; Electrical Tools; Voltage Testers

Objectives

- Describe appropriate clothing and PPE to wear when working with electricity.
- Explain first aid procedures for eyes.
- Describe the devices used to lock out power.
- Tell how to keep plant personnel out of an area where electrical work is being performed.
- Explain the purpose of a voltage tester.

Lesson 3: Electrical Safety Procedures

Topics

Energy Control; Lockout/Tagout Procedures; Using Power Tools Safely; Power Tool Safety Rules; Recognizing Electric Shock Victims; First Aid for Shock Victims

Objectives

- Explain the concepts of energy control and zero energy state.
- Summarize the OSHA lockout procedure.
- Explain how portable power tools are grounded.
- List some common symptoms of electric shock.
- Summarize the steps involved in administering CPR.

Lesson 4: The National Electrical Code®

Topics

Overview of the *NEC*; Chapter 1: General *NEC*; Chapter 2: Wiring and Protection; Chapter 3: Wiring Methods and Materials; Chapter 4: Equipment for General Use; Chapter 5: Special Occupancies; Chapter 6: Special Equipment; Chapter 7: Special Conditions; Chapter 8: Communications Systems; Chapter 9: Tables; Informative Annexes

Objectives

- Understand the purpose and scope of the National Electrical Code.
- Define key terms related to the National Electrical Code.
- Determine requirements for electrical installations.
- Locate and reference common National Electrical Code articles.
- Identify common calculation tables.

Lesson 5: Grounding, Ground Faults, and Short Circuits

Topics

Equipment Grounding; Circuit Grounding; Protection Against Ground Faults; Transformer Grounding; Effects of Impedance; Grounding Through Enclosures; Visual Indication of Ground for Ungrounded Circuits; Grounded Conductor Alarms; Detecting Faults Automatically; Static Electricity

Objectives

- State the reason why circuits should be grounded.
- Explain how to test a circuit for proper grounding.
- Explain how a ground-fault circuit interrupter works.
- Contrast current electricity and static electricity and explain why each can be hazardous.
- Identify the correct extinguisher to use on flammable liquid fires and on energized electrical equipment fires.

Lesson 6: Fuses and Circuit Breakers

Topics

The Purpose of a Fuse; Lead-Wire Fuses; Cartridge Fuses; Dual-Element Cartridge Fuses; Current-Limiting Fuses; Power Fuses; Cartridge Fuse Classes, Sizes, and Ratings; Installing Cartridge Fuses; Plug Fuses; Glass-Tube Fuses; Kinds of Circuit Breakers; Magnetic Circuit Breakers; Thermal-Magnetic Circuit Breakers; Ambient-Compensated Circuit Breakers; Molded-Case Circuit Breakers; Low-Voltage Power Circuit Breakers; Circuit Breaker Tripping; Circuit Breaker Reset and Fuse Replacement

Objectives

- Explain how a dual-element cartridge fuse works.
- List the *NEC* rules on installing fuses.
- Explain how a circuit breaker works.
- Describe molded-case circuit breakers.
- Explain the steps involved in fuse replacement and/or circuit breaker reset.

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Lesson 7: Motor Protection

Topics

The Importance of Motor Protection; Motor-Feeder Protection; Feeder Size; Branch Circuits; Motor Branch-Circuit Overcurrent Protection; Motor-Running Overcurrent Protection; Inherent Thermal Protection; Temperature-Sensing Devices; Current-Sensing Devices; Melting-Alloy Relays; Bimetallic Relays; Selecting Motor Protection; Ambient-Compensated Overload Relays; Single Phasing; Protecting Overload Relays

Objectives

- List the steps in determining the correct rating of the motor feeder protection.
- Explain how to select a thermal overload relay.
- Explain how thermostatic, resistance, and thermocouple detectors work.
- Contrast temperature-sensing devices and current-sensing devices.
- Explain how various relays provide motor protection.
- Define single phasing.