



M&A Safety Services

512 Viaulet Road
Youngsville, Louisiana 70592
Main: 337-451-4685
Fax: 337-451-5847
www.masafetyservices.com

Electrical Safety (NFPA 70E) 8 Hour Course Outline

Prerequisites: This course shall have no formal pre-requisite.

Course Length: 8 hours – Course length shall vary depending on the number of delegates.
Total course time includes breaks.

Class Size: The maximum number of delegates that may be trained and tested per instructor shall be thirty-five (35) in the classroom session.

Course Objective

-) Provide delegates with the knowledge to safely perform work around energized and non-energized electrical equipment.
-) Provide delegates with recommended practices and guidelines to perform safely while working with electricity.
-) Delegates should be able to demonstrate knowledge during written examination.

Course Design

-) Power Point© / Lecture / Audio Video / Visual Aids

Successful Course Completion

-) Requires a minimum score of 75% or better.
-) Grades shall be calculated by dividing the number of questions answered correctly by the total number of exam questions.
-) Delegates will have no more than thirty (30) minutes to complete the exam.

Course Content Summary

-) Classroom

Breaks: 10 minutes (approximately every hour)

Lunch: 1 Hour

Course Outline

Introduction

-) Purpose
-) Scope
 - o Covered
 - o Not Covered



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Safety Related Work Practices

) Definitions

- Arc Flash Hazard
- Boundaries
 - Arc Flash
 - Limited Approach
 - Restricted Approach
- De-energized
- Electrically Safe Work Condition
- Fault Current
- Fault Current Available
 - Figure 100.0 Available Fault Current
- Incident Energy
- Incident Energy Analysis
- Nominal Voltage
- Qualified Person
- Risk Assessment
- Working Distance

) Application of Safety-Related Work Practices and Procedures

- Employer Responsibilities
- Employee Responsibilities

) General Requirements for Electrical Safety-Related Work Practices

- Electrical Safety Program
 - Inspection
 - Condition of Maintenance
 - Awareness and Self-Discipline
 - Electrical Safety Program Principles
 - Electrical Safety Program Controls
 - Electrical Safety Program Procedures
 - Risk Assessment Procedures
 - Human Error
 - Hierarchy of Risk Control Methods
 -) Elimination
 -) Substitution
 -) Engineering Controls
 -) Awareness
 -) Administrative Controls
 -) PPE
 - Job Safety Planning and Job Briefing
 - Incident Investigations



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- Auditing
- Lockout/Tagout Program
- Training Requirements
 - Initial Training
 - Retraining
 - Lockout/Tagout Training
 - Emergency Response Training
 -) Contact Release
 -) First Aid Training
-) Establishing an Electrically Safe Work Condition
 - Lockout/Tagout Program
 - Definitions
 - The Fatal Five
 - What is LOTO?
 - Zero Energy State
 - The 4 E's to Energy Control
 -) Energy
 -) Engineering
 -) Education
 -) Enforcement
 - Energy
 -) Kinetic
 -) Potential
 - Hierarchy of Controls
 -) Elimination and Substitution
 -) Engineering
 -) Administrative
 -) Personal Protective Equipment
 - Employer/Employee Responsibilities
 - Training
 - Lockout Devices
 -) Circuit Breaker Lockout
 -) Valve Lockout
 -) Plug Lockout
 -) Pneumatic Plug Lockout
 -) Wall Switch Lockout
 -) Adjustable Cable Lockout
 -) Hasp Lockout
 -) Group Lock Box
 - Tagout



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-) Tagout Device
-) Additional Training
-) General Rules
- Lockout Tagout
 -) Who can Lock Equipment?
 -) Group LOTO
 -) Outside Personnel
 -) Shift or Personnel Changes
 -) How to Perform LOTO Safely
- LOTO Procedures
 -) Eight Steps for Lockout/Tagout
 - Step 1 – Determine All Possible Sources
 - Step 2 – Open the Disconnecting Device(s) for Each Source.
 - Step 3 – Wherever Possible, Visually Verify
 - Step 4 – Release Stored Electrical Energy
 - Step 5 – Release or Block Stored Mechanical Energy
 - Step 6 – Apply lockout/tagout devices
 - Step 7 – Test Each Phase Conductor or Circuit part
 - Step 8 - Ground the Phase Conductors or Circuit Parts
 -) Start-up Guidelines
- Process Equipment and Piping Isolation Procedures
 -) Purpose/Scope
 -) Applications
 -) Hazards
 -) Responsibilities
 -) Isolation Procedures
 - Double Block and Bleed
 - Slip Blind or Spectacle Blind
 - Blind Flange
- General Requirements
- Summary
-) Work Involving Electrical Hazards
 - Electrically Safe Work Conditions
 - Infeasibility
 - Equipment Operating at Less Than 50 Volts
 - Normal Operating Condition
 - Energized Electrical Work Permit
 - When Required
 - Elements of Work Permit
 - Electric Shock



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- Common Electrical Hazards
 - Effects of Electrical Current
 - Prohibited Actions
 - Common Mistakes That Lead to Electrical Hazards
 - Elements of a Work Permit
 - Exemptions to Having a Work Permit
 - Shock Risk Assessments
 - Additional Protective Measurements
 - Shock Protection Boundaries
 - Table 130.4(D)(a)
 - Table 130.4(D)(b)
 - Limited Approach Boundary
 - Approach by Unqualified Persons
 - Working at or Close to the Limited Approach Boundary
 - Entering the Limited Approach Boundary
 - Restricted Approach Boundary
-) Arc Flash Risk Assessment
- Estimate of Likelihood and Severity
 - Arc Flash Boundary
 - Arc Flash
 - The incident energy analysis method in accordance with 130.5(G)
 - The arc flash PPE category method in accordance with 130.7(C)(15)
 - Incident Energy Analysis Method
 - Equipment Labeling
-) Other Precautions for Personnel Activities
- Alertness
 - Blind Reaching
 - Illumination
 - Table 130.5(C) Estimate of the Likelihood of Occurrence of an Arc Flash Incident for ac and dc Systems
 - Table 130.5(G) Selection of Arc-Rated Clothing and Other PPE When the Incident Energy Analysis Method Is Used
 - Conductive Articles Being Worn
-) Personal Protective Equipment
- Movement and Visibility
 - Head, Face, Neck, and Chin (Head Area) Protection
 - Eye Protection
 - Hearing Protection
 - Body Protection



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- Hand and Arm Protection
 - Table 130.7(C)(7) Rubber Insulating Equipment, Maximum Test Intervals
- Foot Protection
- Factors in Selection of Protective Clothing
- Arc Flash Protective Equipment
- Clothing and Other Apparel Not Permitted
- Care and Maintenance of Arc-Rated Clothing and Arc-Rated Arc Flash Suits
- Standards for Personal Protective Equipment (PPE)
 - Table 130.7(C)(14) Informational Note: Standards For Personal Protective Equipment
 - Table 130.7(G) Informational Note: Standards on Other Protective Equipment
- Arc Flash PPE Category Method
 - Table 130.7(C)(15)(a) Arc-Flash PPE Categories for Alternating Current (ac) Systems
 - Table 130.7(C)(15)(b) Arc-Flash PPE Categories for Direct Current (dc) Systems
 - Table 130.7(C)(15)(c) Personal Protective Equipment (PPE) – Arc Flash Categories 1-4
- PPE Categories 1-4

-) Insulated Tools and Equipment
 - Portable Ladders

-) Alerting Techniques
 - Safety Signs and Tags
 - Barricades
 - Attendants

-) Overhead Line Clearance
 - Work Within the Limited Approach Boundary or Arc Flash Boundary
 - Overhead Lines
 - Elevated Equipment

-) Underground Electrical Lines
-) Cutting or Drilling

- Safety-Related Maintenance Requirements
 -) General Maintenance Requirements
 -) Hazardous (Classified) Locations
 -) Batteries and Battery Rooms
 -) Portable Electric Tools and Equipment



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-) Personal Safety and Protective Equipment

Informative Annexes

-) Annex C – Limits of Approach
-) Annex D - Incident Energy and Arc Flash Boundary Calculation Methods
-) Annex E – Electrical Safety Program
-) Annex F - Risk Assessment and Risk Control
-) Annex G - Sample Lockout/Tagout Program
-) Annex H - Guidance on Selection of Protective Clothing and Other Personal Protective Equipment (PPE)
-) Annex I - Job Briefing and Planning Checklist
-) Annex J - Energized Electrical Work Permit

Practical Session

-) Conduct Risk Assessment and Risk Control
-) Complete Job Briefing and Planning Checklist
-) Complete Energized Electrical Work Permit

Training Center Provided Material

-) Course Materials

Delegate Requirements

-) None

Reference Material / Documents

- NFPA 70E Standard (National Fire Protection Agency)
 -) 2018 Edition