



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) 16 Hour

Course Outline

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

Course Length: 16 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 and practical exercises.

Course Design

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

Successful Course Completion

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

Course Content Summary

- Classroom

Breaks: 10 minutes (approximately every hour)

Lunch: 1 Hour

Course Outline

Introduction

- Purpose
- Scope
 - Covered
 - Not Covered

Safety Related Work Practices

- Definitions
 - Arc Flash Hazard
 - Arc Rating
 - Authorized Lockout/Tagout Employee
 - Boundaries
 - Arc Flash
 - Limited Approach
 - Restricted Approach
 - Confined Space
 - 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
 - Responsibilities
 - Employer
 - Employee
 - HSE Manager
 - Senior Engineers and Staff
 - Arc Flash Coordinator and Staff
 - Senior Management
 - Captains/Chief Engineers/Facility Managers
 - Site Safety Officers/Training Coordinators
 - Supervisors
 - Qualified Electrical Workers
 - Vessel Crew
 - Houma Technical Department
- General Requirements for Electrical Safety-Related Work Practices
 - Basic Electrical Safety Principles
 - Electrical Safety Program
 - Inspection



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- 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
- Auditing
- Lockout/Tagout Program
- Training Requirements
 - Initial Training
 - Retraining
 - Lockout/Tagout Training
 - Documenting Training and Experience
 - 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
 - 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
 - Shock Risk Assessments
 - 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 PPE
 - 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
 - General Requirements
 - Movement and Visibility
 - Head, Face, Neck, and Chin (Head Area) Protection
 - Eye Protection
 - Hearing Protection
 - Body Protection
 - Hand and Arm Protection
 - Table 130.7(C)(7) Rubber Insulating Equipment, Maximum Test Intervals
 - Foot Protection
 - Insulating Materials and Tools
 - Access Limiting Equipment
 - 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
- Alerting Techniques
 - Safety Signs and Tags
 - Barricades
 - Attendants



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Flexible Cords and Portable Electrical Equipment

- General
- Portable Cord-and-Plug Devices
- Lamps
- Wet or Damp Locations

Overhead Line Clearance

Power Electronic Equipment and Electricity

Utility and High Voltage (600V) Electrical Work

Minimizing Electrical Hazards

- Arc Flash Hazards Analysis Implementation
- Electrical Equipment Labeling

Safety-Related Maintenance Requirements

- General Maintenance Requirements
- Hazardous (Classified) Locations
- Batteries and Battery Rooms
- Portable Electric Tools and Equipment
- 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
 - Identifying Electrical Hazards
- 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

ESP Highlights



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Practical Session

- Conduct Risk Assessment and Risk Control
- Complete Job Briefing and Planning Checklist
- Complete Energized Electrical Work Permit
- Personal Protective Equipment
 - Selection
 - Inspection
 - Proper Donning

Training Center Provided Material

- Course Materials

Delegate Requirements

- None

Reference Material / Documents

NFPA 70E Standard (National Fire Protection Agency)

- 2018 Edition
- WMI-DD Electrical Safety Program