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**NETA** Member Firm

## **ELECTRICAL & ARC FLASH SAFETY TRAINING, 8 Hour**

**Reference Docs: NFPA 70E-2018; OSHA 1910 Subparts 'S', 'J' & 'I'; OSHA 1926 Subpart 'V'**

**Course Overview:** This course introduces personnel to the methods used to identify the shock and arc-flash 'hazards' and 'risks' associated with electrical energy, and work practices to establish an electrically safe work condition. "Incident Energy" and "Limits of Approach", as defined on equipment labels, are discussed along with guidance on selection and use of personal protective equipment (PPE), and application of lockout/tag out (LOTO). Safety-related maintenance practices are addressed, along with appropriate means to document and communicate methods used to avoid or limit the injury or damage to health from electrical hazards.

Students receive a hard copy workbook that follows the presentation and allows the student room to take notes. The workbook also includes attachments of arc-flash label examples, PPE category levels, Rubber glove class & color chart, and six-step compliance check list. A student group proficiency exam is given at class end and certificates are provided to those students completing the training. The end customer also receives the same student workbook, along with the student roster, for file to meet employer training documentation the employee received as outlined in NFPA 70E; Article 120.2(4).

### **Course Outline:**

- I. Electrical injuries & work related "AT Risk" behaviors
  - A. Electrical Safety Injury Statics.
  - B. Safety Triangle of Probability "At Risk Behaviors".
  - C. NIOSH Film; Journeyman electricians involved in two separate arc-flash electrical events.
  
- II. Codes, Standards and Enforcement
  - A. OSHA requirements; general and specific duty clauses.
  - B. OSHA relationship with NFPA.
  - C. OSHA identifies what "shall" be done & NFPA 70E identifies "how" it will be done.
  - D. Essential Elements of NFPA 70E; divided into five sections.
  - E. Verification of zero energy state prior to start work on or about electrical equipment.
  
- III. General Requirements for Electrical Safety Related Work Practices
  - A. Commercial and industrial facilities that connect to supply side of electrical service.
  - B. Electrical Safety Program and Plan.
  - C. Training requirements to include 'contact release and responsible employees responding to a medical emergency.
  - D. Qualified person and Unqualified Person requirements and accountability
  
- IV. Work Involving Electrical Hazards
  - A. Exposure to electric shock; touch and step potential
  - B. Arc Flash and Blast: how an arc flash is created, magnitude of arc-flash event
  - C. Films of Two Arc-Flash case studies
  - D. Cooper Bussman film on arc-flash/safe work practices

- E. Measuring 'Incident Energy' as calories per centimeter squared; bolted fault conditions and arcing fault conditions.
- F. Electrical Hazard "Risk Assessment": Arc-Flash and Shock risk assessments
- G. Approach boundaries: Arc-Flash, Limited Approach & Restricted Approach
- H. Equipment Labeling; Nominal System Voltage, Arc-Flash Boundary & available 'incident energy' at the corresponding working distance for low and medium voltage applications and minimum arc-rating of clothing.
- I. Review of equipment labeling layout and application.

V. PERSONAL PROTECTIVE CLOTHING (PPE)

- A. Clothing designed for protection from arc-flash and electrical shock events; undergarments; movement and visibility; head, face, neck & chin (head area); eye protection; hearing protection; body protection; Hand and arm protection; foot protection; clothing materials and characteristics.
- B. Arc-Rated clothing types and categories I, II, III, IV rated in calories per square centimeter.
- C. PPE clothing care and maintenance.
- D. Salisbury films: arc-rated clothing and care and use of electrical insulating gloves.

VI. Lockout and Tagout (LOTO)

- A. Procedures to establish requirements for lockout of energy isolating devices.
- B. Voltage verification.
- C. LOTO procedures: simple and complex.
- D. procedures installing LOTO and removing LOTO.

VII. Responsibilities – Briefing(s) and Planning

- A. 'Qualified' person conducts job briefing prior to "start work".
- B. Details covered during Job Briefing and worker responsibilities.
- C. Energized work Permit requirements and exceptions.
- D. Use of electrical test equipment and visual inspection.
- E. Safety signs and Barricades.

VIII. General Maintenance Requirements

- A. Electrical equipment aging factors to consider.
- B. Responsibility for maintenance; equipment owner or the owner's designated representative.
- C. Industry practice installing test and calibration decals to equipment indicating maintenance Completed.
- D. Maintenance requirements: manufacturer, industry standards.

IX. Six Step Compliance Check-List

- A. Review of OSHA compliance identified in NFPA 70E.
- B. Student exam.

Please contact the undersigned with questions or clarifications regarding this training program.

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