

## UNIT 1: ELECTRICAL SAFETY FACTS

- Why be Concerned about Electrical Safety?
- Fact by the Numbers (Disabling and Non-Disabling)
- Electrical Industry Study Findings (Electrocutions, Fatalities)
- U.S. Fatalities with Potential Arc Component (History)
- Importance of Electrical Safety
- U.S. Industrial Low Voltage Fatalities
- Electrocution by Age
- Anyone, Anywhere, Incident Story

## UNIT 2: GOVERNMENT REGULATIONS & STANDARDS

- Regulations and Standards (OSHA, NFPA, NEC, NESC)
- General OSHA Regulations
- OSHA Requirements
- NFPA 70E Strategies
- NFPA 70E Definitions
- What Makes a Person Qualified
- Skills & Knowledge of a Qualified Person
- Responsibilities of a Host Employer
- Contractor Responsibilities
- NFPA Approach to Electrical Safety
- NFPA 70E Requirements
- Maintenance Reduces Risk
- Electrical Safety-Related Work Practices

## UNIT 3: ELECTRICAL HAZARDS & PROTECTION STRATEGIES

- What are the Electrical Hazards
- Electrical Hazards – Shock
- Touch and Step Potential
- What Step Potential Can Look Like
- Doesn't Take Much
- Ohm's Law
- Water and Electricity – A Fatal Combination
- Impact of Conditions on Current
- NEC vs. 70E in Normal and Abnormal Conditions
- No PPE Required for Normal Operation If
- Work Practices Protect You from Electrical Shock
- Shock Boundaries Limited and Restricted
- High Voltage Shock Protection Boundary
- Energized Electrical Work Permit (EEWP)
- When an EEWP is Not Required
- PPE and Tools for Shock Protection
- PPE Gloves (Types, Sizing, Testing, Leather Protectors)
- Other PPE (Hard Hats, Footwear)
- Insulated Tools (Identifying Genuine Insulated Tools, Caring for)
- Mitigating Shock Exposure

## UNIT 4: ARC FLASH

- What Is an Arc Flash
- Arc Flash Types (Open Air, Ejected Arc, Arc in a Box, Tracking Arc)
- Why Is Arc Flash Such A Concern
- Arc Blast
- Arc Flash in MCC, Metal Clad or Enclosed Switchgear
- What Work Safety Practices Protect You from Arc Flash Injuries
- Reducing Arc Exposure Through Safety by Design
- Arc-Resistant Switchgear Reduces Arc Hazard
- Racking Power Circuit Breakers (Remote Racking Systems)
- Reducing the Arc Hazard (blast blankets, equipment shields)
- Maintenance Switches, Load Break Plugs, Infrared Windows
- Arc and Shock Boundaries Determining, Practical Application
- 3 Alerting Techniques (Safety signs & tags, Barricades, Attendants)

## UNIT 5: ARC-RATED PERSONAL PROTECTIVE EQUIPMENT

- Probability of Survival
- Costs of Cotton vs. Arc Rated: Examples: 2 Real Incidents
- Hazard and Risk Level Determines Required PPE

- Dangerous Clothing Characteristics
- PPE Standards and Layering Principles
- Hard Hats & Safety Glasses and their Limits
- Balaclava Hood to Face Shield
- Hearing Protection
- Glove Arc Ratings (Limiting Factors, Leather Glove Ratings cal/cm<sup>2</sup>)
- AR Categories (ARC) or PPE Levels
- NFPA-70E 2015 Annex Table H.3(b)
- Arc-Rated Undergarments
- Arc-rated hair nets and beard nets are available
- Disposable Arc-Rated Materials for Dirty Applications
- High Visibility Vest + Arc-Rating + Rainwear + Winter Wear
- Arc Flash Protection Principles
- Wear Required Level of PPE
- Conductive Articles (watches, glasses, rings, necklaces, key rings)
- "FR" Term Replaced by Arc-Rated
- Protective Clothing after 480 Volt Flash
- PPE is the Last Line of Defense

## UNIT 6: RISK ASSESSMENT

- The best ways to reduce hazard exposure
- Risk Assessment Requirements
- Incident Energy Analysis Requirements
- Tables vs Calculations
- Practice Problems utilizing tables of NFPA 70E
- Arc Flash Labels Required Information
- What Equipment Must be Labeled
- Determining Arc Flash Boundary

## UNIT 7: SAFETY RELATED WORK PRACTICES

- Exposed to Electrical Hazards
- Electrically Safe Work Condition
- ISOLATE to create an electrically safe work condition
- Job Briefing and Your Briefing Responsibilities
- Each Boundary Has Requirements
- Barricade, Identify the Energized Work Zone
- The Use of Alerting Techniques on Look-Alike Equipment
- The Use of Tape & Rope as ONLY Temporary Barricades
- Storing Materials in Front of Equipment, Working Space

## UNIT 8: SAFETY RELATED WORK PRACTICES (EQUIPMENT)

- Ground Fault Circuit Interrupters (GFCI)
- GFCI Inspection and Maintenance, testing
- Plug & Cord Connected Tools, Inspecting
- Extension Cords and Cables
- Barriers Shielding Workers from Voltage
- Voltage Detection Equipment (Types, Tips, Categories)
- Exposer to Electrical Hazards
- ONE Hand Rule
- The Two Types of Lockout/Tagout
- Grounding Equipment

## UNIT 9: SAFETY RELATED WORK PRACTICES (HAZARDS)

- Mobile Equipment & Limited Approach Boundary
- Working Overhead
- Safety Requirements for Special Equipment
- Helping Someone Getting Shocked
- Training Personnel (Types of, Qualified Person)
- Annually inspect and Retraining all qualified workers
- Training and Auditing Strongly Improve Compliance
- Record Keeping
- 7 Electrical Safety Habits

## UNIT 10: SAFETY RELATED WORK PRACTICES

- General Rules
- Safety Never Ends
- Safety Quiz