2016 BOC Program

Arc Flash Awareness
What is an arc flash?
Arcing vs. Bolted Faults

Cause and Result

Bolted Short Circuit

Arcing Short Circuit

Extreme Heat 35,000 °F
Molten Metal
Pressure Waves
Sound Waves
Shrapnel
Hot Air-Rapid Expansion
Intense Light

Copper Vapor: Solid to Vapor Expands by 67,000 times
The Effects on Combustible Clothing
Injuries and Fatalities

- During a seven-year study conducted by the U.S. Dept. of Labor’s Bureau of Labor Statistics, 2,576 U.S. workers died and another 32,807 sustained lost-time injuries, missing an average of 13 days away from work due to electrical shock or burn injuries.

- These statistics were validated in a second study involving more than 120,000 employees that determined arc flash injuries accounted for 77% of all recorded electrical injuries. The average cost of medical treatment for survivors of arc flash incidents is $1,500,000.
NFPA 70E – OSHA 1910.269

NFPA 70E
- Requirements for safe work practices
- Addresses hazards:
  - Shock
  - Arc Flash
- Requirements for shock and arc flash boundaries
- Requirements for personal protective equipment
- Incident Energy and flash boundary calculations (<1000V, 5kA-106kA)
What To Do With These Standards?

Know the Definitions

Application of Safety Related Work Practices
- Establish an Electrical Safety Program
- Determine and Establish Training Requirements
- Host and Contract Employer’s Responsibility
- Use of Electrical Equipment

Establishing an Electrically Safe Work Condition
- Verification of an Electrically Safe Work Condition
- De-energize and Lock Out – Tag Out
- Temporary Protective Grounding

Work Involving Electrical Hazard
- Electrically Safe Working Conditions
- Working While Exposed to Electrical Hazards (Energized Work Permit)
- Approach Boundaries to Energized Equipment (Shock Hazard)
- Arc Flash Risk Assessment
- Other Precautions for Personnel Activities
- Personal and Other Protective Equipment
- Work Within the Limited Approach or Arc Flash Boundaries (OH Lines)

Underground Electrical Lines and Equipment
- Cutting or Drilling
What To Do With These Standards? (Cont.)

Safety Related Maintenance Requirements
- General Maintenance Requirements
- Substations, Switchgear Panelboards, MCCs, and Disconnects
- Premises Wiring
- Controller Equipment
- Fuses and Breakers
- Rotating Equipment
- Hazardous (Classified) Locations
- Personal Safety and Protective Equipment

Safety Requirements for Special Equipment (If applicable)
- Work Practices for Electrolytic Cells
- Safety Requirements Related to Batteries and Battery Rooms
- Safety Practices for the Use of Lasers
- Safety Practices for Power Electronic Equipment
Arc Flash & Shock Hazards Labels

WARNING

Arc Flash and Shock Hazard
Appropriate PPE Required

Flash Hazard Boundary: 12 ft
Flash Hazard: 17 cal/cm² at 2 ft

Multi layer clothing including arc rated long sleeve shirt and pants, safety glasses, hearing protection, leather gloves and shoes with leather uppers. The 40 cal/cm² outer layer shall include an arc rated coverall, or arc rated suit coat and pants, and an arc rated hood.

Level 3

480 VAC Shock Hazard when cover is removed
Glove Class 00
Restricted Approach: 1 ft Limited Approach: 3 ft 6 in

Equipment ID: L4 SC LCUS/swg 01/07/15

BOC Program – Arc Flash Awareness

Westar Energy
Arc Flash & Shock Hazards Labels

DANGER

NO SAFE PPE EXISTS
ENERGIZED WORK PROHIBITED

Flash Hazard Boundary: 41 ft 10 in
Flash Hazard: 105 cal/cm^2 at 2 ft

Dangerous! DO NOT WORK ON LIVE!

480 VAC Shock Hazard when cover is removed
Glove Class 00
Restricted Approach: 1 ft  Limited Approach: 3 ft 6 in

Equipment ID: L4 SC LCUS/swg 01/07/15
Necessary PPE & LOTO
Testing Equipment & Insulated Tools
Contact Information

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