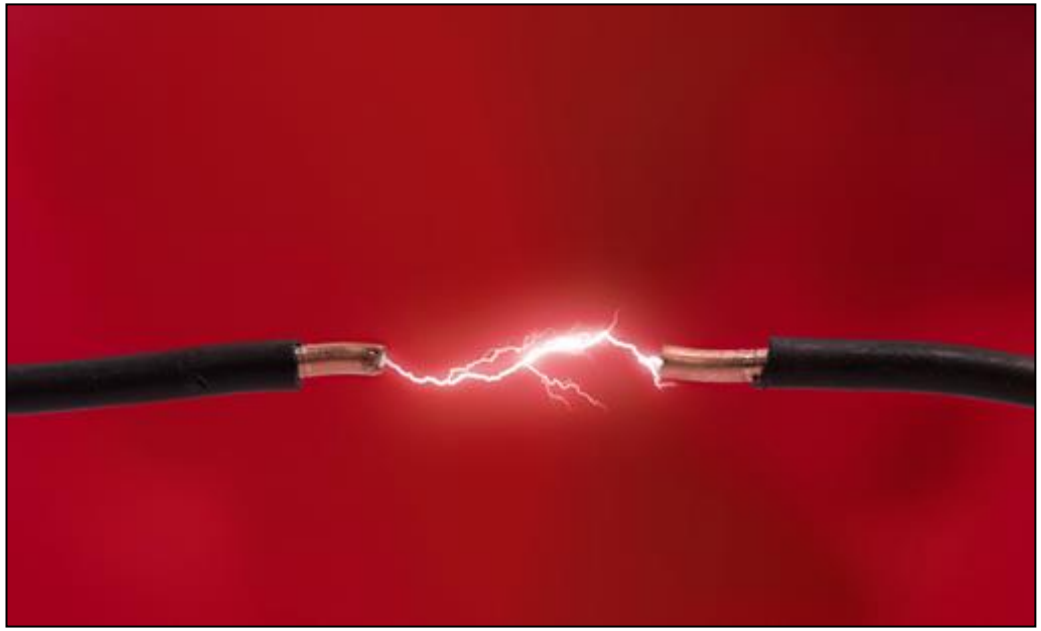
Arc Flash Safety

Qualified Persons Working On
Or Near Energized Equipment



BLR
BUSINESS & LEGAL REPORTS

Objectives

You will be able to:

- Identify the causes and risks of arc flash
- Implement safe work procedures
- Identify and wear appropriate PPE
- Respond to an arc flash

What Is an Arc Flash?

- Electrical short circuit—or arc—through the air
- Concentrated energy explodes outward
- High-intensity flash
- Instantaneous arc blast pressure wave
- Superheated ball of gas—melts metal, burns clothes and skin

Image Credit: OSHA

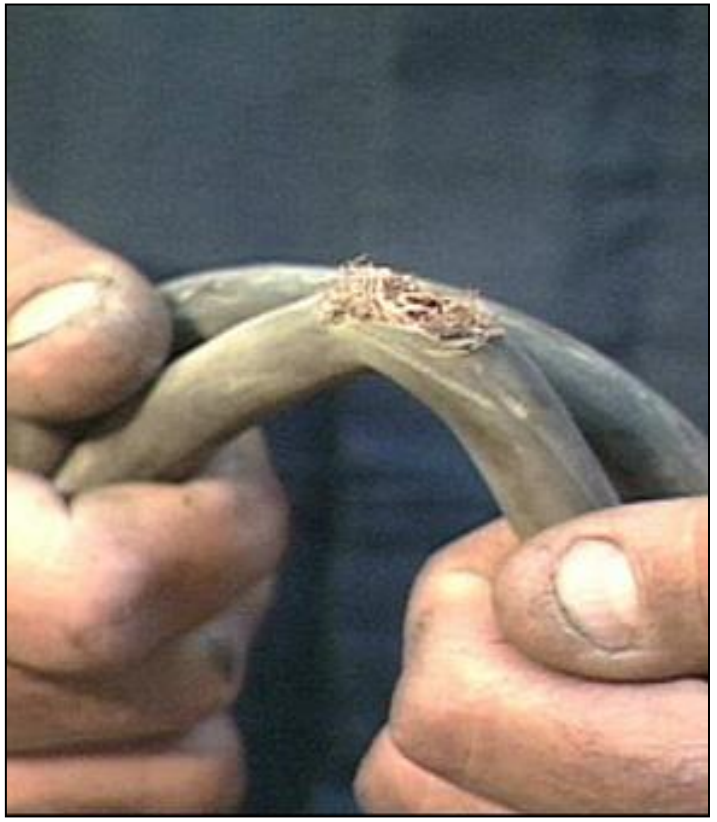
Arc Flash Effects

- Severe burns
  - Fireball destroys skin and tissue
  - Heat blast can extend several feet from source
  - Burns from hot surfaces, projectiles, and fireball
- Hearing loss
- Extensive damage to equipment
- Punctures and lacerations

Image Credit: OSHA

Causes of Arc Flash

- Dropped tools
- Accidental contact with electrical systems
- Improper work procedures
- Insulation failure
- Voltage testing with inappropriate instrument
- Inattentiveness



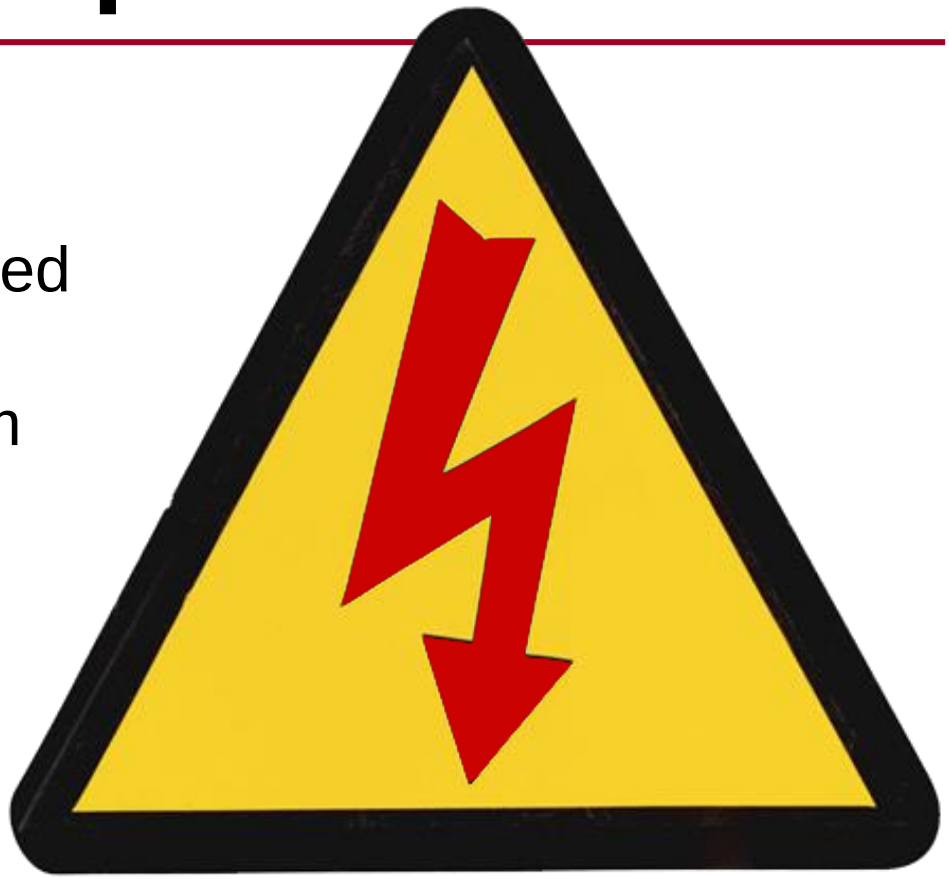
Causes of Arc Flash (cont.)

- Buildup of dust, impurities, and corrosion on insulating surfaces
- Sparks produced during racking of breakers, replacement of fuses, and closing into faulted lines
- Birds or rodents that break leads at connections

Arc Flash Exposure Risk

Workers are at higher risk when:

- Exposed to energized parts often
- Required to perform multiple tasks
- Poorly trained
- Concentration is broken



Arc Flash Exposure Risk (cont.)

Risk is lower when:

- Clear work practices are established
- Training is thorough and up to date
- Proper PPE is worn
- Equipment is routinely maintained
- Workers are alert

Exercise—Hazards and Risks

List 4 arc flash effects

- Severe Burns
- Hearing Loss
- Excessive Damage to Equipment
- Puncture Wounds and Lacerations

Exercise (cont.)

List at least 3 causes of arc flash

- Dropped Tools
- Accidental contact with electrical systems
- Improper work procedures
- Insulation failure
- Voltage testing with inappropriate tool
- Buildup of dust, impurities and corrosion
- Sparks produced during maintenance
- Birds or rodents that break connection leads
- Worker Inattentiveness

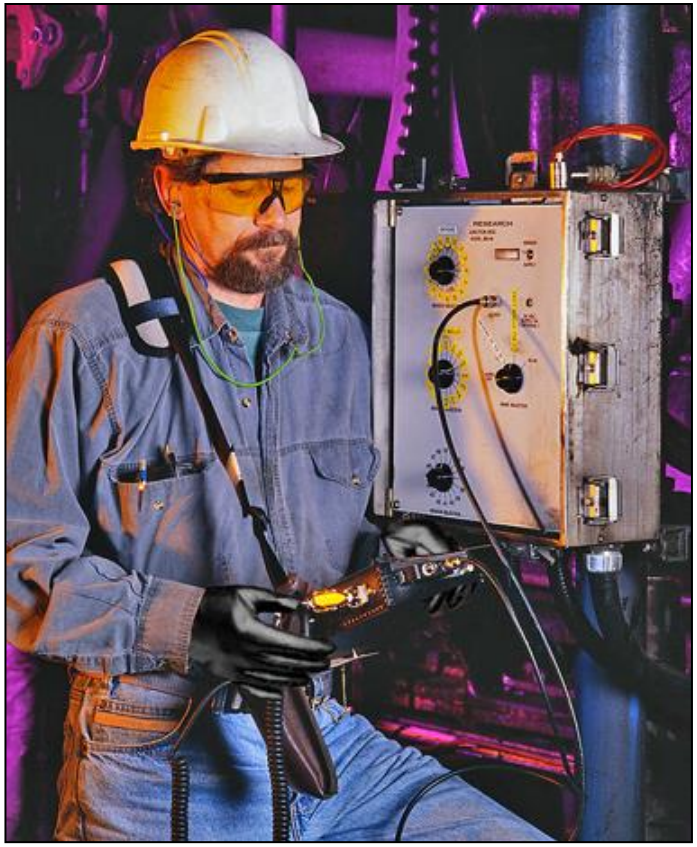
Arc Flash Hazards—Any Questions?

Do you understand:

- What an arc flash is?
- Effects of a flash?
- What can cause a flash?
- Your exposure risk?

Arc Flash Prevention

- Allow only qualified persons
- De-energize equipment whenever possible
- Create safe work conditions
- Use proper equipment



Safe Work on Energized Parts

Never work on live equipment, except when:

- De-energizing introduces additional or increased hazards
- It is not feasible to de-energize
- The proper training and safety equipment is provided

Safe Work Practices

1. Review the operation
2. Determine the hazards
3. Determine and implement protective measures
4. Wear appropriate PPE
5. Know how to respond to an arc flash incident

Safe Work Practices—Review the Operation

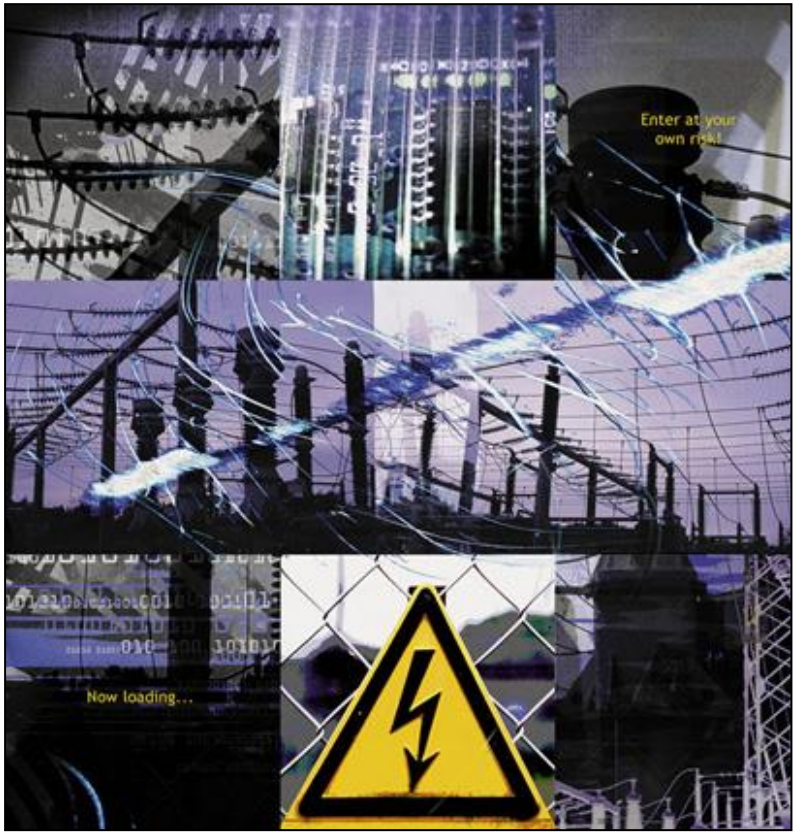
- Read all warning signs
- Read the hot work permit
- Match the tools to the operation
- Take whatever readings are necessary to quantify the system's operation.

Safe Work Practices—Determine the Hazards

- Identify and inspect energized parts
- Respect the flash protection boundary
- Identify sharp objects and other obstructions
- Identify all environmental hazards

Safe Work Practices—The Flash Protection Boundary

- Limited approach boundary
- Restricted approach boundary
- Prohibited approach boundary



Safe Work Practices—Deenergizing and Lockout

- Identify all possible sources of energy supply
- Open disconnecting device(s)
- Verify device is open
- Apply lockout/tagout devices
- Test voltage—double check instrument rating
- Apply grounding devices

Safe Work Practices—Wear Appropriate PPE

- Helmet or headgear
- Arc-rated face shield
- Safety glasses
- Rated gloves
- Rated shoes/boots
- Rated flame-resistant clothing
- No metal button, clasps, or zippers!

Credit: Web Soft Safety Solutions

Explosion Response Procedure

- Turn off the power
- Extinguish flames
- Call for help
- Begin CPR and first aid, if trained

Take Other Precautions

- Only qualified persons
- Wear only nonconductive apparel—no jewelry
- Work area must be illuminated
- No conductive liquids near electrical work or equipment
- Do not defeat electrical interlocks
- Double-check for the right tools

Safe Work Practices—Any Questions?

Do you understand about:

- Operations review?
- Hazard determination?
- Work practices?
- PPE?
- Emergency response?

Warning Labels

- Placed on all equipment with potential arc flash hazard

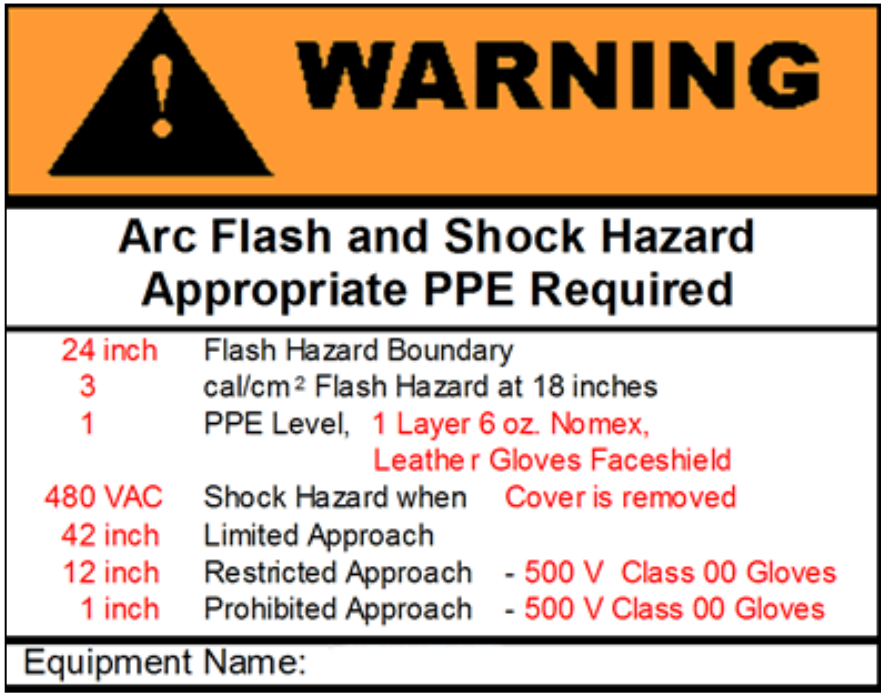


Photo Credit: MIDWEST

Report—and Don't Use—Damaged Equipment

Stop using and report:

- Broken or missing covers
- Damaged tools
- Damaged equipment
- Improper equipment placement

Photo Credit: OSHA

Exercise

What are the 5 steps to safe work practices?

1. Review the operation
2. Determine the hazards
3. Determine and implement protective measures
4. Wear appropriate PPE
5. Know how to respond to an arc flash incident

KEY POINTS To Remember!

- Inspect equipment and work areas for arc flash hazards and risks
- Human error a common cause of arc flash
- De-energize whenever possible
- Follow safe work practices
- Wear all required PPE
- Report—and don't use—damaged equipment and tools