



GOALS

This safety session should teach employees to:

- Understand the hazards associated with an electrical arc flash.
- Understand precautions to take to protect themselves.
- Be aware of arc flash hazards in their workplace.

Applicable Regulations: 29 CFR 1910.333-335, and references National Fire Protection Association (NFPA) 70E and NFPA 70, National Electrical Code.



1. An arc flash is a short circuit through the air.

- In an arc flash incident, an enormous amount of concentrated radiant energy explodes outward from electrical equipment, creating:
 - Pressure waves that can damage your hearing;
 - Pressure waves that can send loose material like pieces of damaged equipment, tools, and other objects flying through the air;
 - A high-intensity flash that can damage your eyesight; *and*
 - A superheated ball of gas that can severely burn a worker's body and melt metal.
- Each year more than 2,000 people are treated in burn centers with severe arc flash injuries.

2. Many workers believe that if they don't touch something that can shock them, they are protected from an electrical arc flash.

- Workers have been injured even though they were 10 feet or more away from the arc center.
- Electrical arc flash hazards do not occur only in the presence of high-voltage industrial facilities.
- Low-voltage equipment sources (below 600 volts (V) but above 50V) account for most electrical arc flash occurrences.

3. An arc flash occurs when electric current flows between two or more separated energized conducting surfaces.

- Insulation failure is a common cause of an arc.
- A buildup of dust, impurities, and corrosion on insulating surfaces can provide a path for current.
- Equipment failure can occur because of the use of substandard parts, improper installation, or even normal wear and tear.
- Gnawing birds, bees, and rodents can also snap leads at connections.
- Some arcs are caused by human error, including dropped tools, accidental contact with electrical systems, and improper work procedures.



4. The best way to prevent arc flash incidents from occurring is to de-energize equipment before beginning work.

- Appropriate protective precautions, including the use of personal protective equipment (PPE), are necessary during the de-energizing process.
- Workers should not work on live equipment (greater than 50 V) unless:
 - De-energizing introduces additional or increased hazards such as cutting ventilation to a hazardous location.
 - It is infeasible because of equipment design or operational limitations such as when voltage testing is required for diagnostic purposes.
- When it is necessary to work on energized equipment, workers should follow safe work practices, including assessing the risks, wearing proper PPE, and using the proper tools.

5. The Occupational Safety and Health Administration (OSHA) requires the use of safety signs, safety symbols, or accident prevention tags to warn employees about electrical hazards that may endanger them.

- NFPA 70E recommends that facility owners perform an arc flash assessment before allowing a worker to work on energized equipment.
- The assessment will determine the flash protection boundary distance and the type of PPE required.
- That boundary is the distance from the arc source within which the potential incident heat energy could cause a second-degree burn.
- The limited approach boundary marks where a shock hazard exists and may not be crossed by “unqualified” persons unless accompanied by “qualified” persons.
- The restricted approach boundary is the area near the exposed live parts that may be crossed only by “qualified” persons using appropriate shock prevention techniques and equipment.

6. Workers should always protect themselves by:

- Obeying all warning signs and labels
- Wearing all required PPE
- Only performing functions for which they have been trained and “qualified”

DISCUSSION POINTS:

Review any areas in your facility where there is a danger of arc flash. Discuss the restrictions on entering these areas and the required PPE.

CONCLUSIONS:

Arc flash is a deadly danger—no one can safely ignore it. Be sure you follow all warnings—every time.

TEST YOUR KNOWLEDGE:

Have your employees take the Hazards of Electrical Arc Flash quiz. By testing their knowledge, you can see how well they understand this important subject or whether they need to review the topic again soon.



HAZARDS OF ELECTRICAL ARC FLASH QUIZ

- 1. An arc flash is a short circuit through the air.**
a. True b. False
- 2. An arc flash can:**
a. Damage your hearing.
b. Send pieces of damaged equipment flying through the air.
c. Create a flash that can damage your eyesight.
d. Cause severe burns.
e. All of the above.
- 3. Workers can protect themselves from arc flash by not touching something that can shock them.**
a. True b. False
- 4. An arc flash occurs when electric current flows between two or more separated energized conducting surfaces.**
a. True b. False
- 5. Human error, including dropped tools, accidental contact with electrical systems, and improper work procedures can cause an arc flash.**
a. True b. False
- 6. A common cause of an arc flash is insulation failure, perhaps due to corrosion or a buildup of dust and impurities.**
a. True b. False
- 7. The best way to prevent arc flash incidents from occurring is to de-energize equipment before beginning work.**
a. True b. False
- 8. Arc flashes occur only when there is high-voltage equipment.**
a. True b. False
- 9. There is no way to tell how close you can go to electrical equipment.**
a. True b. False
- 10. Workers should always protect themselves by:**
a. Obeying all warning signs and labels
b. Wearing all required PPE
c. Performing only functions for which they have been trained and "qualified"
d. All of the above

When you have completed this quiz, turn it in to your supervisor.

Name: _____

Date: _____



ANSWERS TO HAZARDS OF ELECTRICAL ARC FLASH QUIZ

1. a. True.
2. e. All of the above.
3. b. False. Workers have been injured even though they were 10 or more feet away from the arc center.
4. a. True.
5. a. True.
6. a. True.
7. a. True.
8. b. False. Locations consisting of many low-voltage equipment sources account for the most electrical arc flash occurrences.
9. b. False. A flash hazard analysis will determine the flash protection boundary distance and the type of PPE required.
10. d. All of the above.