

Arc Flash Hazards Quiz 1

How much do you know about Arc Flash Hazards?

Did you know that the monetary cost of a single arc flash incident can easily exceed \$1 million per incident, including medical expenses and the cost of equipment replacement, downtime and insurance? Maybe even more alarming is the fact that the explosive energy released during an arcing fault will send more than 2,000 workers to burn centers this year. In most cases, this can be prevented with the proper knowledge of Arc Flash hazards and prevention.

Question 1 Which of the following is the NFPA definition of an Arc Flash Hazard?

An Arc Flash Hazard is defined by National Fire Protection Association (NFPA), as:

- A. A dangerous condition associated with the possible release of energy caused by equipment short circuiting.
- B. A dangerous condition associated with the possible release of energy caused by an electric arc, or
- C. A dangerous condition associated with the possible release of molten metal caused by equipment exploding.

Question 2 Which of the following describes the explosive nature of an Arc Flash?

- A. An extremely bright flash of light occurs
- B. It produces some of the highest temperatures known to occur on earth
- C. Energy released is a function of system voltage, fault current magnitude and fault duration
- D. All of the above

An explanation regarding the nature of Arc Flashes

The many hazards created by arcing faults in today's industrial power systems arise from two factors: the tremendous amounts of energy that can be delivered to such arcs and the workers' close proximity to them.

The development of a high-current arcing fault is like an explosion. When an arcing fault is being established, current begins passing through ionized air. Large volumes of ionized gases, along with metal from the vaporized conductors, are rapidly expelled. As the arc runs its course, electrical energy continues to be converted into extremely hazardous forms of energy.

Some additional facts about Arc Flashes

- As the arc is first established, an extremely bright flash of light occurs. The intensity of the light can cause immediate vision damage.
- The electric current flowing through the ionized air can create some of the highest temperatures known to occur on earth – up to 35,000 degrees Fahrenheit. This is 4x the surface temperature of the sun! Even at much lower levels, conventional clothing ignites, causing severe, often fatal burns.

- The intense heat from the arc causes the air to suddenly expand producing a blast of very strong air pressure. This thermoacoustic effect results in a shock wave with impulse sounds that can rupture eardrums, collapse lungs, and cause fatal injuries.
- All known materials are vaporized at this temperature, subsequently expanding in volume. The resultant air blast can eject molten metal to great distances with extreme force. The molten metal can ignite conventional clothing and the shrapnel that's ejected can result in physical trauma to the worker.

Question 3 Which of the following could cause an arc flash?

- A. Spark discharge from accidental touching or tools dropping
- B. Inadequate short circuit ratings
- C. Tracking across insulation surfaces
- D. Corrosion or contamination
- E. Improper work procedures
- F. All of the above

Arcs can be initiated many different causes, including...

Glow to arc discharge resulting from:

- **Dust and impurities** on insulating surfaces can provide a path for current, allowing it to flash over and create arc discharge across the surface.
- **Corrosion of equipment parts** can create impurities on insulating surfaces which may also provide a path for current, allowing it to flash over and create arc discharge across the surface.

Condensation of vapor and water dripping can cause tracking on the surface of insulating material, which can create flashover to ground and potential escalation to phase to phase arcing.

Spark discharge resulting from accidentally touching live exposed parts or dropping tools on or near equipment may initiate arcs.

Over-voltages across narrow gaps such as those that occur when the air gap between conductors of different phases is very narrow (due to poor workmanship or damage to insulating materials) in which case arcs may strike during over-voltages.

Failure of insulating materials

Electric arcs are also caused by **improperly designed or utilized equipment and improper work procedures.**

Additional Resources

- Arc Flash Info Center
- Arc Flash articles, white papers & tech topics
- Mersen Electrical Services
- Fuse Control Program