

# What Is an Arc Flash?

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By



An arc flash is an explosive burst of heat and light, caused by a sudden, uncontrolled electrical arc (or current passing through the air). Temperatures may reach as high as 35,000°F in just 1/1000 of a second, vaporizing metal, causing fatal burns, and generating a blast wave that can collapse workers' lungs and rupture eardrums. Shrapnel, toxic gases, and intense UV rays can cause additional injuries. Arc flash accidents can kill in an instant, or cause a long, slow, and painful death. Even non-fatal injuries from an arc flash may require months or years of medical care and therapy.

The Bureau of Labor Statistics notes that between 1992 and 2002, electrical accidents in the workplace caused 3,378 deaths and an additional 46,598 non-fatal injuries. About 5% of all workplace deaths were related to electrical equipment.

## What Happens in an Arc Flash?

An arc can begin whenever a conductive object gets too close to an exposed current source. Dropping tools, opening panels on deteriorated equipment, inserting or removing components from an energized system, and even a rodent infestation can provide an opportunity for an arc to begin.

If that arc has enough energy, it can continue to ionize the air around it. This ionization reduces the electrical resistance along the path of the arc, allowing the arc to draw even more current. As more and more energy flows through the arc, the process builds on itself, and in a moment the arc becomes an arc flash.

The primary source of injury in an arc flash is the burst of heat. Just like lightning, an arc flash releases an enormous amount of heat energy in a very short time. That heat also melts and vaporizes the materials around it, such as wiring and metal equipment panels, as well as drastically raising the temperature of the air nearby.

As this material heats up very quickly, it expands to create a pressure wave, just like thunder. That pressure wave can scatter the broken and melted fragments of equipment like a spray of bullets. Even after the immediate blast, the vaporized material can form a cloud of toxic vapor, mist, and dust. Arc flash is one of the more dramatic electrical accidents, and is often deadly where proper safety precautions have not been taken.

## Steps for Arc Flash Safety

Preventing arc flash accidents or minimizing their impact requires a comprehensive safety program, involving both electrical workers and management. The following steps should be taken to ensure worker safety.

First, perform an electrical risk assessment. Use the guidelines in NFPA 70E to identify and assess electrical shock and arc flash hazards throughout your facility.

Determine protective boundaries for electrical equipment. NFPA 70E recommends Limited and Restricted Approach Boundaries to protect workers from electric shock, and a separate Arc Flash Boundary to protect them from burns in the event of an arc flash. Employees should keep outside these boundaries during ordinary work.

Identify equipment and components that present a significant risk of arc flash. The NFPA identifies the following types of frequently-affected equipment:

- Switchboards
- Panelboards
- Industrial control panels
- Meter socket enclosures
- Motor control centers
- Temporary installations

Next, ensure all potential arc flash hazards are properly labeled. Warning labels that inform workers of potential hazards are a key part of arc flash prevention.

Finally, make sure that workers are adequately trained. Any employees who will work on electrical equipment need to be aware of the dangers of arc flash, understand the warning labels and signs, and know how to select and use the appropriate PPE.

**This means no untrained workers should touch, move or work on any electrical equipment or device until a qualified person has evaluated the task and determined it is safe to approach and work on or alter the electrical device or equipment. Not following this may put your life or health at risk.**

