Different Arc Flash Type Events
to be assessed when designing safety programs:

- Open Air Arc Flashes
- Ejected Arc Flashes
- Equipment Focused Arc Flashes (Arc-in-a-box)
- Tracking Arc Flashes

Many companies are being asked by their insurance companies to have Arc Flash labeling implemented throughout their facilities to mitigate the potential life threatening hazard and financial devastating effect of an Arc Flash incident.

ZINNIEL ELECTRIC OFFERS THREE DIFFERENT LEVELS OF LABELING ASSISTANCE:

**Level 1:** Zinniel Electric (ZE) will supply arc flash labels and Site one-line drawing. ZE would work with the Customer’s electrician (You) to supply the required info to create the labels. Level 1 includes no site visit/assessment by ZE. Prices are based on number of required devices to be labeled:
- 10 or less = $1,000
- 11-50 = $1,500
- 51-100 = $3,000
- over 100 devices call for prices

**Level 2:** ZE conducts the Site assessment, supply and install arc flash labels and Site one-line drawing. Prices are based on number of required devices to be labeled:
- 10 or less = $2,000
- 11-50 = $4,500
- 51-100 = $8,400
- over 100 devices call for prices

**Level 3:** ZE conducts Site assessment, supply and install arc flash labels and Site one-line drawing, and provide individual panel board and disconnect schedules. Prices are based on number of required devices to be labeled:
- 10 or less = $2,500
- 11-50 = $4,800
- 51-100 = $9,600
- over 100 devices call for prices

Arc Flash Hazards
It's a matter of life and death!

Protect yourself and your employees from harm and from the liability.

FREE ASSESSMENT!
Call or email Zinniel Electric today for a free assessment.
1-800-817-7930 info@zinnielelectric.com

WARNING
Arc Flash Hazard
Appropriate PPE Required

- Equipment Type: 600V Switchgear
- Grounding: Enameled
- Work Distance: 25 inches (640 mm)
- Available短路Current: 45 kA
- Flash Protection Boundary: 260 inches
Arc Flash Consequences

What is an Arc Flash

An arc flash is the light and heat produced from an electric arc supplied with sufficient electrical energy to cause substantial damage or harm, fire or injury. Electrical arcs, when fed by limited energy and well controlled, produce very bright light (as in arc lamps—enclosed, or with open electrodes), and are also used for welding and other industrial applications.

Explosive Energy from an Arc Flash

Arc flash temperatures can reach or exceed 35,000 °F (19,400 °C) at the arc terminals. The massive energy released in the fault rapidly vaporizes the metal conductors involved, blasting molten metal and expanding plasma outward with extreme force. A typical arc flash incident can be inconsequential but could conceivably easily produce a more severe explosion (see calculation below). The result of the violent event can cause destruction of equipment involved, fire, and injury not only to an electrical worker but also to bystanders. During the arc flash, electrical energy vaporizes the metal, which changes from solid state to gas vapor and suddenly expands by a factor of 69,000 times in volume.

Destruction from an Arc Flash

In addition to the explosive blast, called the arc blast of such a fault, destruction also arises from the intense radiant heat produced by the arc. The metal plasma produces tremendous amounts of light energy from far infrared to ultraviolet. Surfaces of nearby objects, including people absorb this energy and are instantly heated to vaporizing temperatures. The effects of this can be seen on adjacent walls and equipment - they are often ablated and eroded from the radiant effects.

Calculation of an Arc Flash Blast

As an example of the energy released in an arc flash incident, consider a single phase-to-phase fault on a 480 V system with 20,000 amps of fault current. The resulting power is 9.6 MW. If the fault lasts for 10 cycles at 60 Hz, the resulting energy would be 1600 kilojoules. For comparison, TNT releases 2175 J/g or more when detonated (a conventional value of 4,184 J/g is used for TNT)

What if a fault lasts for 10 cycles at 60 Hz, the resulting energy would be 1600 kilojoules. For comparison, a high-amperage arc can produce a pressure wave blast with a force of up to 1000 pounds. The victim can be thrown by the force of this pressure. Injuries can occur from falling or colliding with nearby objects. Hearing loss may also result from the blast.

The intense heat may melt metal electrical components and blast molten droplets considerable distances. These droplets harden rapidly and can lodge in a person’s skin, ignite clothing and may cause lung damage.

The Consequences of Arc Flash Burns Are Severe

Physically, victims may suffer from chronic pain and scarring. Workers may also have difficulty reintegrating into the community, and may experience anxiety, depression, or other psychological symptoms. The social and economic costs may also be high. Workers’ compensation pays only a portion of lost wages. Some workers may not be able to return to their pre-injury job. Employers bear the costs associated with lost productivity, reduced competitiveness, employee rehiring and retraining, as well being subject to increases in workers’ compensation premiums.

In general, arc flash incidents which ignite clothing are highly improbable on systems operating at less than 200 volts phase to phase (120 V to ground) when fed by less than a 125 kVA transformer; at 120 volts does not provide sufficient potential to cause an arc flash hazard. Most 480 V electrical services have sufficient capacity to cause an arc flash hazard. Medium-voltage equipment (above 600 V) is higher energy and therefore a higher potential for an arc flash hazard.

OSHA

OSHA has begun to issue citations based upon the requirements of NFPA 70E. Moreover, an employer who fails to consider and conform to these requirements places itself at risk for liability for negligence when an accident occurs and results in serious injury or death. Protect yourself and your employees from harm and from the liability by addressing this most serious exposure.

Standards

★ The National Electrical Code (NEC) contains requirements for warning labels. See NEC Article 110.16.
★ NFPA 70E 2009 provides guidance on implementing appropriate work practices that are required to safeguard workers from injury while working on or near exposed electrical conductors or circuit parts that could become energized.
★ The Canadian Standards Association’s CSA Z462 Arc Flash Standard is Canada’s version of NFPA70E. Released in 2008.

Design Your Arc Flash Safety Program Today!