Bringing electricity into our homes and places of work is probably the single greatest invention since the wheel. In our modern society we have grown accustomed to flipping a switch and the lights come on; push a button and the microwave cooks our meals, and heats our coffee and electricity heats and cools our homes. We probably don’t even think about the consumption of electricity until the rolling blackouts start. The power goes out and the doors don’t automatically open; the gas pumps won’t work; no one knows how to make change because the computer can not give them the answer.

In the 1950’s having a 30 amp, 120 volt single phase service was considered more than adequate for a modern household. Now we bring 250 to 300 amp services to homes on a regular basis. The average retail building will see 480 volts with a system capacity ranging from 1000 to 3000 amps.

Historically, electrical hazards were viewed primarily as electric shock or electrocution hazards and much has been learned in the last two decades about what happens when an electric arc flash or blast occurs. Electrical shock happens when a person comes into contact with an energized circuit. In addition injury to personnel several feet away from the intense heat and molten metal and glass can result from an arc. Temperatures well over 5,000 degrees Fahrenheit and a powerful explosion can be produced by arc.

**NFPA70E** requires companies to:

- Perform and arc flash hazard analysis on all electrical equipment
- Train workers and update work practices to comply with the standard
- Use products and methods to limit arc flash hazards whenever possible and

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Label electrical equipment showing the level of personal protective equipment a worker must wear when working on energized equipment.
Control measures from **ANSI/AIHA Z10-2005** are:

1) Elimination of the hazard

2) Substitution of less-hazardous system or equipment

3) Engineering controls

4) Warnings

5) Administrative Controls

6) PPE

Boundaries indicating the limited, restricted and prohibited approach are determined by using NFPA Table 2-1.3.4 (2000 edition).

The flash protection boundary is the closest that anyone can approach without use of PPE. This boundary is the distance from the arc source where there is potential heat energy of 1.2 calories/cm² falling on the surface for the skin for 0.1 second. The limited shock approach boundary may only be crossed by an “unqualified” person when they are accompanied by a “qualified” person. Documented training for the hazards of the equipment being serviced are required to become “qualified”. Restricted shock approach boundary may only be crossed by a qualified person that uses adequate shock prevention equipment and techniques and the Prohibited shock approach boundary may only be crossed by a “qualified” person that has the same level of protection as if they were planning on direct contact with live parts.

For PPE requirements an electrical engineer or other qualified person will need to do calculations that determine the incident energy. Appropriate PPE should cover all exposed body parts and can include boots, gloves, safety glasses and flame resistant clothing.

As with any hazard the use of personal protective equipment should be the last resort, not the first solution. The best and most effective way to protect workers is the elimination of the hazard.

In other words: Shut it off! It is more efficient to work on something that has been properly de-energized and locked out than to try to work in what equates to a bomb suit.

Two credible sources of information are **NFPA** and **IEEE**. For more information on **NFPA 70E-2004** go to [www.nfpa.org](http://www.nfpa.org).


ANSI/ Institute of Electrical and Electronic Engineers (IEEE) (2007) National Electrical safety Code **NFPA70** and **NFPA70E**.