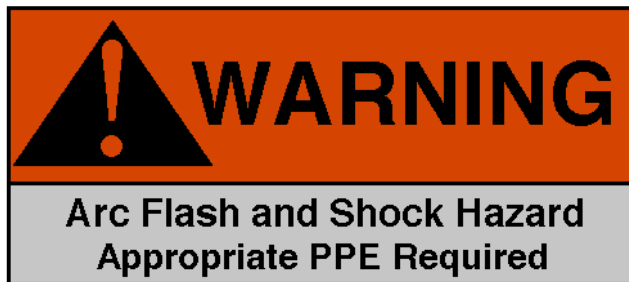


## CONTRACTORS REQUIRED TO PROVIDE WARNING LABELS

### What the NEC states:

“Switchboards, panelboards, industrial control panels, and motor control centers in other than dwelling occupancies, that are likely to require examination, adjustment, servicing, or maintenance while energized, shall be field marked to warn qualified persons of potential electric arc-flash hazards”.



**Figure 1.**

This is a requirement of the National Electric Code (NEC – NFPA 70) and is contained in Section 110.16 Flash Protection. If the equipment has exposed energized contacts or conductors when an enclosure door is opened or service panel removed, it must be field labeled. Figure 1 is an example of one such label. Equipment that may require labels include: circuit breaker panelboards when trim is removed to permit addition or replacement of a breaker, switches with exposed line side contacts, switchgear with exposed buses when rear panels are removed or service doors opened, and production machinery control panels.

### The danger:

Although it is not recommended, it is a fact that electrical workers who install or maintain electrical equipment and circuits frequently do not disconnect the power prior to working on the system. OSHA and the electrical industry have become very concerned about the increasing number of workers being injured or killed while working on energized (hot) equipment and circuits. In addition to the danger of electrocution, hazards from arcing faults (arc-flash) also exist.

It is important that designers, consulting engineers, facility engineers, and maintenance personnel be aware of arc-flash and the hazards that accompany it. A program to place warning labels on all equipment should be given serious consideration. If equipment is not marked or labeled, such omission may be used as evidence of negligence if personnel are injured.

Since this NEC provision affects employee safety, plans and specifications for all construction and modification should reference NEC section 110.16 and require such labeling.

Many jurisdictions do not always adopt the latest edition of the NEC immediately, so some electrical contractors in the area may not be familiar with this code section. Specifications should be very clear that appropriate labeling is a project requirement.

Proper labeling is also one way that engineers may reduce their liability. Facilities engineers and maintenance supervisors should label existing as well as new equipment.

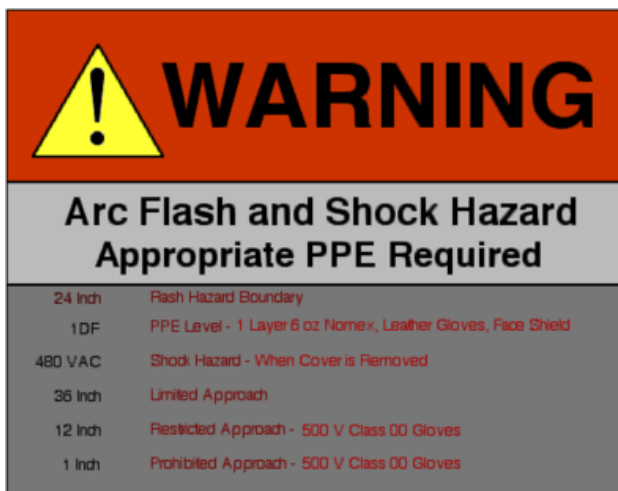
### Identifying the hazards:

Before any warning labels can be applied, a Hazard Analysis should be performed to identify the severity of the hazards that exist.

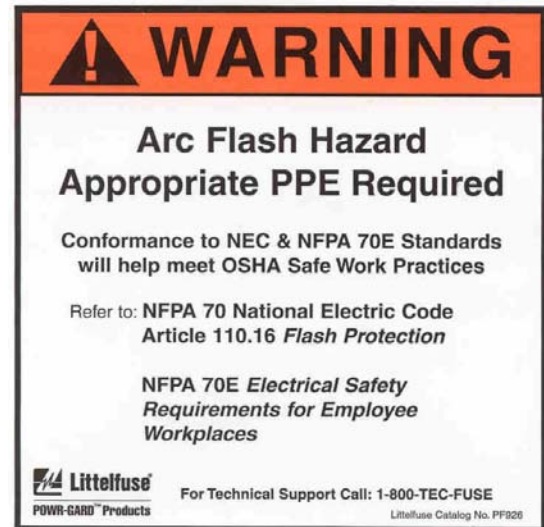
NFPA 70E *Standard for Electrical Safety in the Workplace* outlines shock and flash hazard analysis. The analysis should result in identifying the protection boundaries and the level of personal protective equipment (PPE) required to minimize the risk to personnel.

### What types of labels are required?

Although NEC Section 110.16 requires warning labels, a specific style of the label has not yet been clearly defined. Typical warning labels are shown in Figures 1 thru 3.



**Figure 2.**



**Figure 3.**

As Figure 1 thru 3 illustrate, warning labels can be very basic with minimal information or more detailed with specific information and vary in style. Because a hazard analysis is required to determine exactly what potential hazards exist, many people have adopted the philosophy to use detailed labels that identify approach and flash hazard boundaries as well as the required level of PPE. Code proposals indicate that future NEC requirements will probably enforce labeling with detailed information. Such labels or other permanent marking should be easily visible and attached to all sides of equipment that are likely to be opened or removed for servicing.

Additional information about NEC Section 110.16 and reducing arc-flash hazards is available in Littelfuse Technical Paper *Understanding and Reducing Arc-Flash Hazards*. The paper referenced above, along with other technical articles is available on the Littelfuse web site at [www.littelfuse.com](http://www.littelfuse.com).