

Company Name: \_\_\_\_\_ Dept: \_\_\_\_\_ Location: \_\_\_\_\_ Date: \_\_\_\_\_

#052

## ELECTRICAL GROUNDING

The number of serious violations reported by OSHA in this category is alarmingly high considering the inherent danger of working around high voltage electricity. Branch circuits, ground fault protection/assured equipment grounding conductor problems, heads the list, followed by a lack of a grounding path, either permanent or continuous, the lack of ground fault circuit interrupters (GFCI's), inadequate guarding of live parts and equipment not used properly or in accordance with instructions.

A large majority of electrocutions are caused by voltages of less than 600V. At voltages as low as 115 volts, heart fibrillation can start in 3 or 4 seconds of current flow. The effects of AC current at 60 cycles per second on the body can soon be fatal. At more than 10 mA there is muscle contraction and "no-let-go" danger. More than 30 mA can result in lung paralysis, usually temporary, over 50 mA causes usually fatal heart dysfunction and from 100 mA to 4A ventricular fibrillation is certain and most often fatal. The commonly encountered electrical problems on a building site include:

- Frayed extension cords, usually the result of companies not using cords rated hard or extra hard for construction use.
- Ungrounded equipment which is very dangerous when a tool or equipment shorts or has a fault and the current will seek any path to earth, often through the employee!
- Most receptacles have wiring secured to the box by terminal screws, having them unsecured provides the opportunity for them to become loose and shocking an employee.
- Uncovered panel boxes can lead an employee to believing that the power is not energized and make accidental contact.

Be especially careful in wet conditions, caused either by bad weather or building processes and also remember to take care around portable and vehicle mounted electrical generators. Regular testing and visual inspections of all electrical equipment is required by a designated competent person.

Meeting Conducted By:

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Document Filing Reference

Notes & Suggestions

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#063

## GROUND FAULT CIRCUIT INTERRUPTERS GFCI's

### Grounding

1. Each receptacle must have a grounding contact that is connected to an equipment grounding conductor §2510.7(a)
2. Temporary wiring must be grounded §2405.2(g)
3. Electrically powered tools and electrical equipment with exposed, non-current-carrying metal parts must be grounded (Exception: Double insulated powered tools need not be grounded) §2395.45(b)
4. The frame of a portable generator and the frame of a vehicle where the generator is located need not be grounded under certain conditions §2395.6
5. A system conductor shall be bonded to the generator frame where the generator is a component of a separately derived system §2395.6(c)

### Ground-Fault Circuit Interrupters (GFCI's)

The GFCI device senses ground faults (accidental electrical paths to ground) in circuits and immediately cuts off all electrical power in that circuit. GFCI's are required on receptacles that are not connected to the site's permanent wiring and that have a rating of 15 or 20 amps, 120V, AC, single phase §2405.4(c)

The Assured Equipment Grounding Conductor Program (AEGC) is an approved alternative to the GFCI requirement if the following program elements are included: (a) A description of the program must be written (b) The employer shall designate one or more qualified persons to implement the program (c) Daily visual inspection of included equipment must be conducted (d) All equipment grounding conductors shall be tested for continuity and shall be electrically continuous; all plugs and receptacles must be tested for proper attachment to the equipment grounding conductor (e) Tests shall be performed before first use of newly acquired equipment, before equipment is returned to service, before equipment is used after an incident that may have caused damage, at intervals not to exceed three months (f) The employer shall not make available or permit the use of equipment that has not met the requirements of §2405.4(d) and (g) A means of identifying tested equipment shall be provided.

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#259

## ELECTRICAL HAZARDS

Workers are injured or killed every year in California due to occupational accidents involving uncontrolled exposure to electricity. When shortcuts are taken and safe procedures are not followed, loss of life, permanent disfigurement, lost work time, increased workers' compensation costs, and lawsuits can occur. As per the Bureau of Labor Statistics, 163 workers died from injuries from contact with electric current in 2010. 76 workers died from overhead power lines in the same year.

A worker was electrocuted from accidental contact with an overhead power line. The victim was carrying a metal ladder upright to his work van. The foreman and several of his co-workers observed and verbally warned him about the overhead power line. However, several seconds later, the victim's ladder made contact with the overhead power line and the victim fell to the ground suffering fatal injuries.

With all electrical equipment operations, there is the threat of shock and/or electrocution. Electrical workers are potentially exposed to a variety of hazards such as electric shock (the most common hazard), arc flashes, falls, and thermal burns. When you receive an electric shock, an electric current runs through your body because the body has become a conductor for electricity. Electrocution occurs when enough current flows through your body to cease the functions of vital organs and causes burns to muscular and skin tissues.

What can you do to protect yourself and others from electrical hazards? Employees can prevent shocks and injuries/electrocution from electrical hazards by:

- Understanding electric shock and electrocution
- Recognizing potential hazards around work involving electricity
- Following Cal/OSHA requirements
- Maintaining clearances around panels
- Using proper protective devices
- Eliminating access to exposed energized parts
- Using proper PPE
- Using proper lockout/tagout procedures
- Maintaining proper clearance from overhead lines
- Following proper procedures for confined space/enclosed space /underground electrical work
- Following manufacturer's instructions
- Following safe work practices

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## Electrical Hazards

From 2012 through 2016, 325 U.S. contract workers died because of electrical injuries. Construction trade workers represented 57% of fatal electrical accidents during that time. Despite continuous improvements in construction jobsite safety over the years, electrical exposures are still a major hazard. Workers can be exposed to electrical shock, electrocution, burns, fires, and explosions. Although the number of fatal electrical injuries has fluctuated from year to year, the overall trend continues upward.

**Why do electrical related fatalities continue to trend upward?** One explanation could be the booming demand for contract workers, many of whom may not have had enough electrical safety training. According to the NFPA, a significant number of electrical fatalities involve construction laborers, roofers, service workers, and others – not trained electrical specialists who regularly work with electricity. Another factor is the pressure on workers to get projects done on time and on or under budget, forcing them to work faster, work more hours, or both. That’s a recipe for mistakes.

**Everyone involved in the project needs to take electrical hazards seriously.** OSHA is taking them seriously. In October, OSHA cited a contracting company in Pennsylvania with 5 violations after an employee died from an electrocution accident. The company was fined more than \$330,000.

Are you controlling electrical hazards on your construction sites? Here are 10 of the most common:

1. **Overhead and underground power lines.** Always maintain a minimum distance of 10 feet from overhead power lines and know the location of underground power lines. Install safety barriers and signs to warn workers of the hazards.
2. **Damaged tools and equipment.** Properly maintain all electrical tools and equipment and observe proper Lock Out Tag Out procedures and repair protocols for damaged equipment.
3. **Inadequate wiring and overloaded circuits.** Always ensure the correct wire for the operation and electrical load is used, proper extension cords are used, outlets aren’t overloaded, and proper circuit breakers are used.
4. **Exposed electrical parts.** Temporary lighting and open power distribution units can create exposed electrical hazards that can cause shocks and burns. Use proper guarding mechanisms and routinely check for these hazards.
5. **Improper grounding.** Improperly grounded equipment is the most common OSHA electrical violation. Proper grounding eliminates unwanted voltage and reduces the risk of electrocution.
6. **Damaged insulation.** Check regularly for defective or inadequate insulation, report any findings immediately, and turn off power sources before replacing damaged insulation.
7. **Wet conditions.** Everyone knows electricity and water don’t mix. Be extra cautious about operating equipment in wet locations.
8. **Lack of “top down” commitment.** Electrical safety at the worksite starts at the top, and everyone down the line shares the responsibility. That includes the staffing agency or subcontractor directly employing the worker and the host employer hiring the contractor.
9. **Inadequate training.** Remember that, according to the NFPA report, many electrical related fatalities involve workers other than trained electrical specialists. Every worker on the jobsite needs to be properly trained on working safely around electrical hazards.
10. **Apathy and lack of accountability.** Electricity is easy to take for granted. But when workers get apathetic, bad things happen. Keep electrical safety top of mind on your jobsites and make everyone accountable for jobsite safety.



Company: \_\_\_\_\_

## SAFETY TRAINING SESSION RECORD

SUBJECT: \_\_\_\_\_

Location: \_\_\_\_\_

Date of Session: \_\_\_\_\_ Time Started: \_\_\_\_\_ Time Ended: \_\_\_\_\_

Trainer's Name and Signature: \_\_\_\_\_

*Those present at training - PLEASE WRITE LEGIBLY IN PRINT:*

<u>PRINT NAME</u>	<u>SIGNATURE</u>	<u>JOB TITLE</u>
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