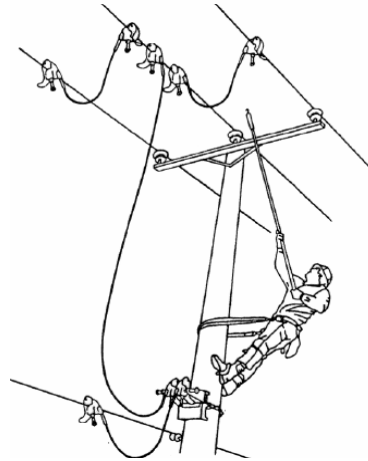


# Grounding & Bonding Handout

## **IF IT'S NOT GROUNDED, IT'S NOT DEAD!**

How many times have we heard that said? Well the fact is, just because a circuit or piece of equipment is grounded, even properly, that's no guarantee that there is no hazardous potential present. To begin to understand temporary protective grounding, we need to understand the purpose for grounding. All circuits are protected by current sensitive devices like fuses, reclosing devices, and breakers. Those devices are designed to de-energize a circuit, or remove the source of potential in the event of a system over-load or an unexpected fault.



For electrical workers, we install grounds for two reasons. By installing grounding jumpers in a grounded and short-circuited configuration we ensure that the circuit is de-energized (removed from the source) and if the circuit was to accidentally become re-energized, the current sensitive devices we mentioned earlier will be activated. The design intent of those devices is to remove the circuit or equipment from the source of potential by providing an open point.

### **Key Points to Consider**

🔑 **Plan the Job, Plan for Safety!** Prior to installing grounding equipment, conduct a tailboard or pre-job briefing. Take this time to explain the procedure or task, discuss the hazards associated with the task, and discuss how workers are going to protect themselves from those hazards.



**Take the time to perform a good, in-depth tailboard or pre-job briefing. When you consider the economic and human costs of accidents, talk is cheap! Accidents are not!**



- 🔑 Always inspect all temporary grounding devices prior to use. Remove from service and do not use any damaged or defective equipment.
- 🔑 Always, Always, Always, test the circuit or equipment for the absence of potential (voltage) before installing grounds!
- 🔑 Use only an approved device like a voltage indicator or noisy tester to test for potential. Fuzzing is not an approved method and can, in some cases, give you a false reading!

⚡ When installing grounding jumpers, **the first clamp installed is to the ground source.**

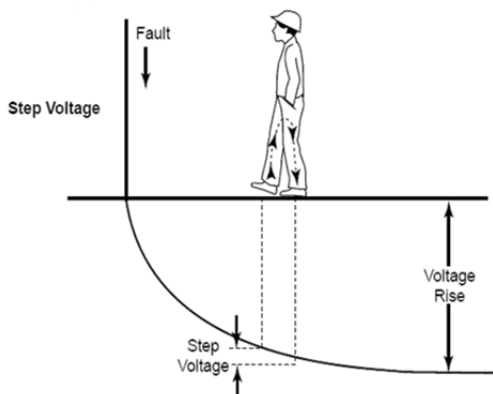
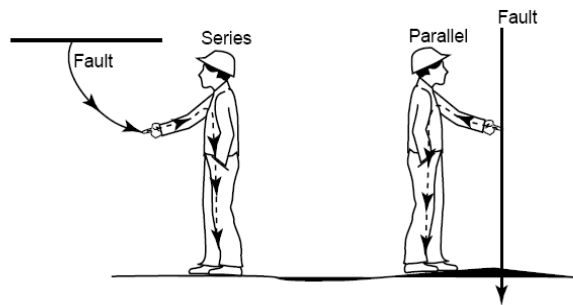
⚡ When removing grounding jumpers, **the last clamp removed is to the ground source.**

⚡ The installation and removal of temporary grounding equipment is NOT a bare-hand or rubber glove procedure. What does this mean? Grounding devices, with the exception of running type grounds at wire set-ups must be installed and removed using a **live-line tool**.

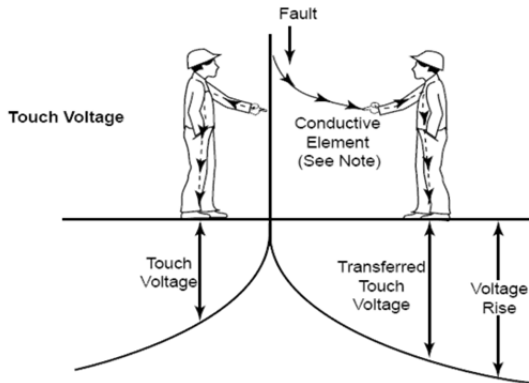
⚡ Temporary grounding devices are designed to cause circuit interrupting devices to operate. In the event of an unintentional re-energizing of a circuit, the interrupting device; the fuse, breaker or reclosing device requires time to operate. Until the interrupting device operates, the entire circuit is energized at system voltage!

⚡ Avoid hazardous differences in potential! Current flow through the body can be harmful and even fatal.

⚡ If your body completes the circuit by creating a series path or a parallel path between two different potentials, harmful levels of current could flow through your body.



⚡ Be aware of the hazards of Step and Touch Potential. No matter what temporary grounding method is used, workers on the ground could be exposed to hazardous potential differences.



Workers on the ground must be protected by the use of rubber insulating footwear, insulating mats or grounding mats

Avoid touching any equipment such as bucket trucks, digger derricks, wire stringing equipment, etc, that could become unintentionally energized

Temporary protective grounding devices must be able to conduct the maximum available fault current that could flow at the point of grounding.

Cable Size	Clearing Time	Amperes
2/0	15 Cycles	33,000
	30 Cycles	26,000
4/0	15 Cycles	53,000
	30 Cycles	41,000

This table from ASTM F-855 shows the current carrying capacity of 2/0 and 4/0 copper grounding cable.

These ratings could change if the cable is damaged, if clamps are damaged, or if the proper clamp is not used.

Always ensure that the clamp matches the part.

Do not attach round jaw clamps to a flat surface.

Do not attach flat jaw clamps to a round surface.



Your only true protection is when you protect yourself from dangerous difference in electrical potential. This statement holds true no matter what type of work you are performing, whether it be live-line bare-hand work, using the rubber glove method on distribution circuits, or performing de-energized work.

The key to working safely is to recognize and understand where hazardous potential differences are, and knowing how to protect yourself and your co-workers from them.