Toolbox Talk

Temporary Electrical Protection

During the phases of construction it is common to see generators, splitters, temporary lighting, battery chargers, corded tools, and a few hundred feet of extension cords. Come to think of it, when those things are missing it becomes difficult to get anything done on site. While convenient and necessary there are some real hazards with temporary power, which is why Electricity is part of the Focus Four.

Construction Standard – 1926.400 (Subpart K)

1926.403 – General: The employer shall ensure that electrical equipment is free from recognized hazards that are likely to cause death or serious physical harm to employees.

1926.404(b) - General: The employer shall use either ground fault circuit interrupters as specified in paragraph (b)(1)(ii) of this section or an assured equipment grounding conductor program as specified in paragraph (b)(1)(iii) of this section to protect employees on construction sites. These requirements are in addition to any other requirements for equipment grounding conductors.

This Toolbox Talk is specifically for temporary wiring, like the use of extension cords. Not using the permanent building wiring which should be protected by the circuit breakers and protected wiring. For the purposes of this lesson, "Permanent building wiring" stops at the wall outlet, any tool or cord plugged into that outlet is considered "Temporary wiring".

What are the Hazards

Electric Shock

- If the protective sheathing on the cord is damaged or missing and a person makes contact with bare wires, becoming the path to ground.
- Wire to Wire contact that can cause damage to tools and equipment, or start a fire
- Wire to Material contact – exposed wire makes contact with conductive material like an aluminum ladder

Arch Flash

- High amperage energy that "jumps" from wire to another nearby conductor. 5,000 – 35,000 degrees!

Indirect Injury

- Fall that happens after a shock/blast/burn

3 Factors of Injury

1. Path the electricity takes through the body. If the path crosses the heart, high chance of atrial fibrillation or death.
2. Intensity of Amps (see chart below)
3. Duration of shock

1 milliamp	0.001 amps	Most adults can sense the feeling
5 milliamps	0.005 amps	GFCI will trip at this difference in current
10 milliamps	0.010 amps	Paralyze muscles (Cannot let go of the wire)
30 milliamps	0.030 amps	Difficulty breathing
75 milliamps	0.075 amps	Heart spasm, ventricular fibrillation
4000 mA	4 amps	Organ and tissue burning
15000 mA	15 amps	Breaker trips

Breakers and Fuses only protect equipment. NOT PEOPLE

Temporary wiring needs to have a Ground-Fault Circuit Interrupt or be part of an Assured Equipment Grounding Conductor Program.

Ground-fault circuit interrupters. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. A GFCI will trip when there is difference of 0.005 amps in the current. Meaning, if there was a bare wire that made contact with a person, a sudden rush of electricity would come through the wire, the GFCI would trip almost immediately and cut power off.

The GFCI device should be as close to the power source as possible, to protect all of the cords that are snaking throughout the work area.

** A GFCI does not trip without reason. The plug is not trying to make your day harder, it is saving your life. Inspect the items plugged into it to find the cause of the problem and fix them as needed.

Assured Equipment Grounding Conductor Program (AEGCP) is used in place of ground-fault circuit interrupters for protection. This is a very hands-on approach where each tool and cord needs to be inspected, reported, and maintained on a monthly basis.

- Keep a written description of the program at the jobsite. Outline specific procedures for the required equipment inspections, tests, and test schedule, and make them available to OSHA and to affected persons *upon demand.*
- Designate one or more competent persons to implement the program. OSHA defines a *competent person*as someone who is a) qualified to identify hazards, and b) authorized to take prompt corrective measures.

How to Spot Bad or Damaged Wiring

- Extension cords that have a permanent twist or curl to them means the copper wiring inside has become damaged from excessive heat or being stretched. This should be thrown out and replaced.
- The ends of the cord have exposed wires from being pulled by the cord. This should be taken off site and fitted with new ends that are UL listed and have a clamping device to keep the wire in the housing.
- Thin brown, white, or green cords that are meant for inside the house are not meant for construction use. Replace immediately with larger gauge cord.
- Missing ground prong. Replace immediately. Can be repaired by taking off site and replacing with new end.
- Tools without ground plugs should have a symbol on their label for double insulated (usually 2 squares) this means the housing of the tool will protect the user from being shocked if the internal wiring faults.

Personal Protective Equipment to use around electricity

Hard Hat: Class E for 20,000 volts of more. Class G for 2,200 volts

Eye Protection: ANSI Z87.1 or Z87.2