

## Electrical Safety Rules

### General Safety Rules

- **The BEST safety device is between your ears. Think before you do anything.**
- Make sure you know how to operate any tool safely before using it. (Your team manager can teach or have someone teach you the correct way to use tools.)
- Wear proper eye protection.
- No horseplay when using tools or cutting devices.
- Do not wear loose clothing or jewelry when working with power tools – the clothing or jewelry can get caught up in the tools.
- If it has sharp teeth and/or makes loud noises it can hurt you – treat it with respect.

### Electrical Safety Rules

- Always unhook the power before working on your device regardless of whether you are using AC or DC power by unplugging it. It is not enough to just turn the power off with a switch on the device. You should do this even if you are using very low voltage / low amperage DC circuits because you can short something and damage your device.
- Remove jewelry before working on any electrical devices. If you forgot to unhook the power your jewelry could create a short and damage your device or if it happens to be a ring it could get very hot very quickly and you would be unable to get it off your finger.
- Any team created wiring should be done with properly insulated wire of the correct gauge for the amperage being carried.
- Do not use exposed wires or connections for AC power
- DI requirements (as of December, 2007). Verify current requirements in the Rules of the Road.
  - Batteries must be unmodified commercially available batteries. Batteries that have a risk of spilling with removable caps, vents, etc. may not be used.
  - DC Voltage is limited to 28V DC.

- Teams must use fuses or other current limiting devices when a DC circuit will draw more than 10 amps.
- If a team does custom wiring for any AC device then the team must use a GFI either built into the device or in the electrical cord that the team uses. If you do not know what a GFI is then you should do additional research and understand this before proceeding with any custom AC wiring.
- If a team AC Device uses more than 1000 watts of power then the device must use a GFI. In the US where 120V AC is typical, this means any device that uses more than 8.3 amps

#### Electrical Motor Safety Rules

- Disconnect all power before working on or wiring a motor.
- Generally you should not open up and make any modifications to the insides of a motor whether DC or AC.
- If using very powerful motors, teams should have emergency switches to cut off the power and consider installing limit switches to protect themselves and their devices. Study the electrical switches pages to learn about limit switches.
- A fuse must be used if a motor is using more than 10 amps of power. In DI, fuses and circuit breakers are safety devices and exempt from cost.

#### Soldering Safety Rules

- Work in a well ventilated area. The smoke formed as you melt solder is mostly from the flux and solder and can be quite irritating to the eyes. Team managers may want to require that team members wear goggles anytime they are soldering
- Use a stand to hold your soldering iron. Always return the soldering iron to the stand when not in use.
- Never touch the element or tip of a soldering iron. Some soldering irons can get up to 750 degrees F. This is why you always want the soldering iron in the same place... so that you don't touch it accidentally.
- Take care to avoid touching electrical wire with the soldering tip (either the wire you are working on OR the cord of the soldering iron). Soldering irons should have a heatproof flex cover for the electrical wire. Plastic can melt immediately when touched by a hot soldering iron and there is a risk of serious burns or electrical shock.
- Wash your hands after using solder. Solder contains lead which is a poisonous metal. Note that lead free solder is available and is required for most applications in Europe.

- Allow joints and components a minute to cool after soldering before touching them.
- First Aid – If you burn yourself with a soldering iron
  - Immediately cool the area under running cool water for at least 5 minutes (15 minutes recommended). Ice can also be used but do not delay the initial cooling with water.
  - Unless recommended by a medical professional, it is probably best to not apply creams or ointments. A dry dressing such as a clean handkerchief or gauze, may be applied to protect the area from dirt.
  - Seek medical attention for large area burns.

#### Compressed Air Safety Rules (in progress)

When using any type of compressed air teams should use a pressure gauge to measure pressure in the container and a safety relief valve to prevent over pressurizing the container. I would recommend a double safety relief valve system in case one of them fails. If you do not understand these terms then you do not need to be using compressed air. For DI, pressure gauges and safety valves are safety devices and exempt from cost.

Source: <http://tech.texasdi.org/safety>