

## **MAJOR PROGRAM POINTS**

# **"ELECTRICAL SAFETY IN THE LABORATORY"**

**Part of the "LABORATORY SAFETY SERIES"**

**Quality Safety and Health Products, for Today...and Tomorrow**

# Outline of Major Points Covered in the "Electrical Safety in the Laboratory" Course

The following outline summarizes the major points of information presented in the course on "Electrical Safety in the Laboratory". The outline can be used to survey the course before taking it on a computer, as well as to review the course when a computer is not available.

- **Electricity is literally everywhere in our laboratories.**
  - Without it most of our operations would come to a standstill.
  - So we need to know how to work with it safely.
- **Accidents and equipment malfunctions can cause problems such as:**
  - Electric shock.
  - Ignition of flammable vapors.
  - Explosions.
- **Performing equipment maintenance or making adjustments without proper precautions can result in serious injuries.**
  - We need to know how electricity works inside and out.
- **The force carried by electrical current is measured in "volts."**
  - Most equipment runs on 120 volts.
  - Heavy duty equipment may require 220 volts.
- **"Current" is the flow of electricity.**
  - The "intensity" of the current is measured in "amperes" (amps).
- **The amount of current that an electrical circuit can carry safely will vary.**
  - It depends on the thickness of the wire.
  - Most laboratory electrical lines can safely carry 20 amps.

- **It is the flow of current (amperage), not the voltage, which causes shocks.**
  - Only .06 amps (the amount of electricity needed to light a Christmas tree bulb) can cause a fatal heart attack.
- **Electricity flows when a "circuit" is completed.**
  - A circuit is a loop of uninterrupted electricity going from a power source to equipment and back again.
  - On/off switches regulate this "loop".
- **The flow of electricity in a circuit can also be broken by a fuse or circuit-breaker.**
  - These are activated if wires are carrying more electricity than they can safely handle.
- **"Stray" electricity is always being pulled toward the ground.**
  - This is one of the major causes of shock.
- **"Grounding" provides a safeguard against this situation.**
  - A ground wire will direct "leaking" electricity back through the circuit, not to the person using the equipment.
  - Ground wires are easily visible in three-prong plugs.
- **To be effective, a ground wire must be plugged into an outlet that is also grounded.**
  - These outlets should be tested annually.
- **For added safety, outlets can be fitted with "Ground Fault Circuit Interrupters" (GFCIs).**
  - GFCIs protect you from "current leakage."
  - They sense stray electricity by measuring the continuity of the current.
  - If any deviation exists, a GFCI will quickly shut off the flow of electricity.
- **Following safe work practices is also critical to working around electricity.**
  - Electricity can always be dangerous.

- **There are three very common electrical hazards.**
  - Fires.
  - Shocks.
  - Burns.
  
- **Many electrical problems involve faulty wiring. So you should:**
  - Check insulation on all equipment wiring before plugging in (look for cracks, etc.).
  - Have faulty wires replaced immediately.
  - Don't overload circuits (this will cause wiring to heat up).
  - Don't use electrical tape to try and "fix" wiring problems.
  
- **Limit use of extension cords (they can develop cracks, etc.).**
  - Some accreditation groups, such as JCAHO and CAP prohibit their use.
  
- **Always use caution when selecting electrical equipment.**
  - Whenever possible use double-insulated tools.
  - Ground stray electricity.
  - Check electrical connections for sparking.
  
- **Be sure to get faulty equipment repaired.**
  - Advise your supervisor about any problems.
  - Don't try to make electrical repairs yourself.
  
- **If you need to adjust an instrument or piece of equipment, or perform routine maintenance, disconnect all the power sources first.**
  - You should also practice "lock-out/tag-out" techniques.
  - Consult your supervisor if you have questions.

- **In areas where flammable materials are used, equipment selection is doubly important.**
  - Motor-driven equipment should have non-sparking motors and switches.
  - Never bring "home appliances" into these areas (most have switches that spark).
  - Check the equipment that is used by maintenance crews (such as vacuum cleaners, power tools, etc.), as well.
- **You should also prevent water and other liquids from contacting electrical equipment, since it:**
  - Can damage sensitive electrical circuits.
  - May cause shock.
- **Guard against any contact with "energized" parts.**
  - Prevent exposure to limit accidents.
- **If an accident does occur, it is important to be prepared.**
  - Never touch a person who is in contact with a live wire.
  - Cut off electrical current at a switch or circuit breaker.
  - Contact emergency medical personnel immediately.
- **Because of the heat generated by electricity, accidents often result in fires.**
  - Always know where fire extinguishers are located in your work area.
  - Remember, electrical fires require Type C extinguishers.
  - If a fire is too much to handle, evacuate the area and contact the fire department.
- **A working knowledge of first aid can also be helpful in case of electrical accidents.**
  - Cover minor burns with loose, dry sterile dressing.
  - Then get medical attention.

- **With more serious electrical accidents, victims may need CPR or treatment for shock. You should:**
  - Learn how to administer CPR.
  - Take other first aid training, if it is available.

**\* \* \* SUMMARY \* \* \***

- **Electricity is a valuable asset. We need to use it correctly and safely.**
- **Follow proper work practices.**
- **Report unsafe conditions.**
- **Don't attempt repairs unless you are qualified.**
- **Be prepared in case of an emergency.**
- **Electricity makes our labs more efficient. It is up to us to make sure we work with it safely!**