

- (o) All 110-volt, 15- or 20-amp circuits shall be grounded, except temporary lighting circuits. Do not wire outlet receptacles into lighting circuits unless they are grounded.
- (p) Never troubleshoot on live circuits unless necessary to perform task. See Section 7 Lock-out/Tag-out.
- (q) Always replace covers on electrical equipment after troubleshooting is completed.
- (r) **DO NOT OPEN THE MAINLINE DISCONNECT SWITCH COVER.** If power is not being supplied to the elevator controller (e.g. open mainline fuses, etc.), advise the building owner to correct the condition. This is not the elevator company's responsibility.
- (s) Keep electric cabinet doors closed when system is energized, whenever possible.
- (t) A ground fault circuit interrupter (GFCI) is required when using portable power tools and drop lights. GFCIs should be tested prior to each use.

## 5.2 Meter Usage Safety Checklist

- ☐ Use Category III multimeters.
- ☐ Follow the manufacturer's safety procedures for the meter used.
- ☐ Be certain the meter is in good operating condition. Notify your supervisor immediately if the meter is damaged.
- ☐ The meter used must meet accepted safety standards for the environment it will be used in.
- ☐ Use a meter with fused current inputs and be sure to check the fuses before taking measurements.
- ☐ Inspect test leads for physical damage before making measurements. If damaged, replace them before proceeding.
- ☐ Use the meter to check continuity of the test leads.
- ☐ Use only test leads that have shrouded connectors and finger guards.
- ☐ Use only meters with recessed input jacks.
- ☐ Select the proper function and range for your measurement and double check before proceeding.

- ☐ Be aware of high-current and high-voltage situations and use the appropriate equipment, such as high-voltage probes and high-current clamps.
- ☐ Always disconnect the “hot” (red) test lead first.
- ☐ Use a meter that has overload protection on the ohm function.
- ☐ When measuring current without a current clamp, turn the power off before connecting into the circuit.

### **5.3 Energized Circuit Troubleshooting Checklist**

Work on de-energized circuits and use lockout/tagout procedures whenever possible.

(a) On live circuits, use personal protective equipment (PPE).

- ☐ Use insulated tools.
- ☐ Wear nonconductive safety glasses or a face shield.
- ☐ Wear rubber insulated gloves with leather protectors rated for the voltage present. Where danger from electric shock extends to arms wear rated rubber sleeves in addition to gloves.
- ☐ Remove watches, jewelry or other metal objects.
- ☐ Stand on an insulated mat or use safety shoes with electrically rated soles.
- ☐ Wear long-sleeved natural-fiber or FR-rated shirts and pants, long-sleeved FR-rated coveralls or other company-approved arc-flash-hazard protection. (Check with your company procedures for specific uniform requirements.)

(b) When taking measurements on live circuits:

- ☐ Hook on the ground clip first, and then make contact with the hot lead. Remove the hot lead first and the ground lead last.
- ☐ Hang or rest the meter if possible. Try to avoid holding it in your hands to minimize personal exposure to the effects of transients.

- ❑ Use the three-point test method, especially when checking to see if a circuit is dead. First, test a known live circuit. Second, test the target circuit. Third, test the live circuit again. This verifies that your meter worked properly before and after the measurement.
- ❑ Use the old electrician's trick of keeping one hand in your pocket. This lessens the chance of a closed circuit across your chest and through your heart.