

# Section 5

## ELECTRICAL SAFETY

### 5.1 General Precautions

- (a) When power is not required to perform the task, lockout/tagout procedures must be followed. Testing and troubleshooting may be done live, but repairs can only be done when system has been properly de-energized or circuits isolated.
- (b) THE FOLLOWING PERSONAL PROTECTIVE EQUIPMENT SHALL BE WORN WHEN TROUBLESHOOTING LIVE ELECTRICAL CIRCUITS:
  - For arc-flash protection long-sleeved natural-fiber or FR-rated shirts and pants, long-sleeved FR-rated coveralls or other company-approved arc-flash-hazard protection
  - For arc-flash protection clean leather gloves when working with 240 volts or more
  - Nonconductive safety glasses
  - EH-rated footwear or rubber mats
  - For electric shock protection, rubber insulated gloves with leather protectors rated for the voltage present. When the danger from electric shock extends to arms as well, rated rubber insulating sleeves in addition to the gloves
- (c) Always use a circuit tester on each circuit before troubleshooting on it because all voltages can be dangerous. Contact with even low voltages can result in serious injury.
- (d) All circuits shall always be treated as LIVE unless tests prove otherwise.
- (e) Before troubleshooting any electrical circuits or apparatus, remove all jewelry, keyrings, cell phones, radios, pagers and other metal objects, etc.

- (f) Never troubleshoot circuits when standing or kneeling on metal, wet surfaces or in water.
- (g) When troubleshooting live circuits, take care to be safely isolated (i.e., rubber mats, isolated tools, EH rated shoes, etc.).
- (h) To prevent shocks, take precautions to:
  - (1) Keep metal objects from touching or being exposed to any LIVE parts, moving machine parts or connections.
  - (2) Do not wear tool belts and do not carry tools in your pockets.
- (i) Use only double-insulated rated tools when troubleshooting on circuits that may not be de-energized.
- (j) While troubleshooting on MG Sets, elevator motors and solid-state motor drives, take extreme precaution, because the armature voltage present may be as high as 600 volts.
- (k) Exercise caution (Be cognizant and prepared to test other circuits that may be “LIVE”) when troubleshooting on multi-car operations especially in group systems, which may have circuits that are LIVE. Even when the mainline disconnect switch is OFF, other circuits may be powered from other sources (group controls, cab lighting, etc.)
- (l) **Always** use fuse pullers to remove and install fuses. Fuses and fuse holders should be marked for proper size and type. Never use a higher amperage fuse, a fuse of a different type or bridge a fuse.
- (m) Use nonconductive flashlights.
- (n) Temporary wiring can be hazardous. All temporary wiring shall comply with the **NEC and OSHA 1910.305**. But when temporary wiring is used, locate wiring in such a manner that no one can trip over it. **Take precautions to protect temporary wiring** from sharp edges and mechanical damage and do not support it with nails or wires.