



## Coffee Break Training - Fire Protection Series

### Inspection Techniques: Overcurrent Protection Devices... or Not

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**Learning Objective:** The student shall be able to identify the purpose of overcurrent protection devices.

The fire or electrical inspector probably had a shocked look on his or her face when they opened the cover of this fuse panel. The copper tube in the right side circuit is not a legal overcurrent protection device.

“Overcurrent protection devices” are fuses or circuit breakers that, according to the National Fire Protection Association (NFPA) 70, *National Electrical Code*<sup>®</sup>, reduce “the current flowing in the faulted circuit to a magnitude substantially less than that obtainable in the same circuit if the device were replaced with a solid conductor having comparable impedance” (resistance). Overcurrent protection devices protect circuits from overheating or other electrical failures.

In today’s example, the copper tube could not be expected to fail in the event of a power surge, and the electrical circuit would remain energized. This hazard should be reported and corrected immediately.

The other devices in the panel are blade-type time-delay fuses. These fuses have two internal current-carrying elements consisting of a short circuit strip, soldered joint, and spring connection. During overload conditions, the soldered joint gets hot enough to melt and the spring shears the junction loose. Under short circuit conditions, the short circuit element operates to open the circuit. This so-called “slow-blow” feature allows temporary and harmless inrush currents to pass without opening the fuse, but is designed to open when sustained overloads and short circuits threaten the circuit.

Slow-blow fuses typically are installed in circuits with a transient or “power-on” surge. These circuits include motors, transformers, and incandescent lamps where there is an initial power surge to start the device, but then is reduced when the device is running. This inrush may be many times the circuit’s full load amperes. Typically, slow-blow fuses are rated between 125 percent to 150 percent of the circuit’s full load amperes.

For additional information, refer to NFPA 70, *National Electrical Code*<sup>®</sup>.



A piece of copper tube has been inserted in the fuse box creating an illegal and dangerous hazard. Photo courtesy Keith Heckler, Rockville Fire Department, MD.



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