

# Navigating Selective Coordination

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## What is Selective Coordination?

Article 100 of the 2008 National Electric Code® contains the following definition, “Coordination (Selective). Localization of an overcurrent condition to restrict outages to the circuit or equipment affected, accomplished by the choice of overcurrent protective devices and their ratings or settings.” A branch circuit overcurrent protective device and its upstream feeder overcurrent protective device are selectively coordinated if any possible overcurrent passing through the branch circuit device is cleared by the branch circuit device before the upstream feeder overcurrent device opens.

## NEC Requirements: The following NEC articles require selective coordination.

- Article 517 - Health Care Facilities
- Article 620 – Elevators, Dumbwaiters...
- Article 700 – Emergency Systems
- Article 701 – Legally Required Standby Systems
- Article 708 – Critical Operations Power Systems (COPS)

## Methods of Evaluating Selectivity:

Traditional time-current curve analysis may not accurately portray the degree of selectivity existing between overcurrent protective devices. This is particularly true when the overcurrent exceeds the 0.01sec melting or clearing current of the overcurrent protective devices. For this reason, fuse manufacturers publish fuse ratio tables. These tables show the minimum ratio in terms of ampere ratings that must be maintained between branch and feeder fuses to assure selective coordination. Similarly, circuit breaker manufacturers publish instantaneous selectivity capability tables which show the range of overcurrents over which a given branch and feeder breaker combination will selectively coordinate.

## How does one evaluate selectivity when the system contains both fuses and circuit breakers?

Traditional time current curve analysis can be used to evaluate selectivity over the long time and short time portions of the circuit breaker time current characteristic curve. A more detailed evaluation is needed to determine selectivity or lack thereof if the overcurrent exceeds the circuit breaker instantaneous trip setting. The following publications provide detailed explanations of appropriate evaluation methods.

- Mersen Tech Topics “Evaluating Selective Coordination between Current-Limiting Fuses and Non Current-Limiting Circuit Breakers” by Steve Hansen and Robert Lyons, Jr.
- IEEE 2008-PSPC-224, “Selectivity Analysis in Low Voltage Power Distribution Systems with Fuses and Circuit Breakers” by Marcelo Valdes, Cindy Cline, Steve Hansen, and Tom Papallo