

6.6 NEC Requirements for Conductors in Parallel [310.4]

(A) General. Ungrounded and neutral conductors sized 1/0 AWG and larger can be connected in parallel. When circuit conductors are run in parallel, the current must be evenly distributed between the individual parallel conductors.

(B) Conductor Characteristics. All circuit conductors within a parallel set must:

- (1) Be the same length.
- (2) Be made of the same conductor material (copper/aluminum).
- (3) Be the same size in circular mil area (minimum 1/0 AWG).
- (4) Have the same insulation (like THHN).
- (5) Terminate in the same method (set screw versus compression).

(C) Separate Raceways or Cables. Raceways or cables containing parallel conductors must have the same electrical characteristics and the same number of conductors. **Figure 6–8**

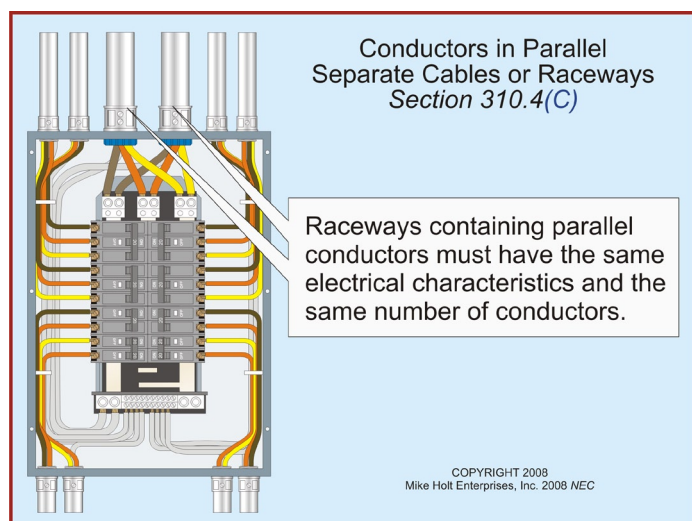


Figure 6–8

Author's Comment: If one set of parallel conductors is run in a metallic raceway and the other conductors are run in PVC conduit, the conductors in the metallic raceway will have an increased opposition to current flow (impedance) as compared to the conductors in the nonmetallic raceway. This results in an unbalanced distribution of current between the parallel conductors. Without getting into the details, this isn't good.

Paralleling is done in sets. Parallel sets of conductors aren't required to have the same physical characteristics as those of another set to achieve balance.

Author's Comment: For example, a 400A feeder with a neutral load of 240A can be paralleled as follows: **Figure 6–9**

- Phase A, Two—250 kcmil THHN aluminum, 100 ft
- Phase B, Two—3/0 THHN copper, 104 ft
- Phase C, Two—3/0 THHN copper, 102 ft
- Neutral, Two—1/0 THHN aluminum, 103 ft
- Equipment Grounding Conductor, Two—3 AWG copper, 101 ft

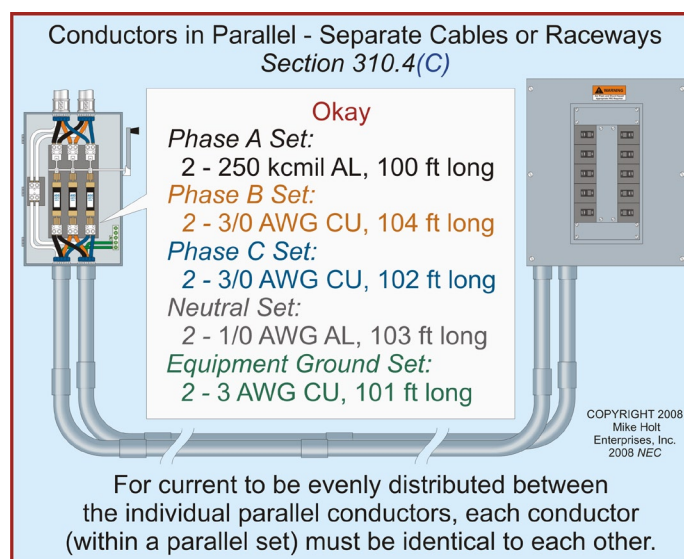


Figure 6–9

(D) Conductor Ampacity Adjustment. Each current-carrying conductor of a paralleled set of conductors must be counted as a current-carrying conductor for the purpose of conductor ampacity adjustment, in accordance with Table 310.15(B)(2)(a). **Figure 6–10**

(E) Equipment Grounding Conductors. The circuit equipment grounding conductors for circuits in parallel must be identical to each other in length, material, size, insulation, and termination. Where raceways requiring equipment grounding conductors are installed in parallel, they each must have an equipment grounding conductor sized in accordance with 250.122. The minimum 1/0 AWG rule for parallel conductors of 310.4 doesn't apply to equipment grounding conductors run in parallel [250.122(F)(1)]. **Figure 6–11**